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EUROPEAN AGRICULTURE:
SCIENTIFIC PROBLEMS IN POST-WAR RECONSTRUCTION

TRANSACTIONS OF A CONFERENCE HELD BY THE DIVISION FOR THE SOCIAL AND INTERNATIONAL RELATIONS OF SCIENCE, MARCH 20–21, 1942

INTRODUCTION

AT the Conference on Science and World Order held in September 1941, of which the transactions have been published by the Association in *The Advancement of Science*, No. 5, Sir John Russell, F.R.S., gave a paper on the 'Re-establishment of the "Scorched Earth" in Europe.' The Allied Post-war Requirements Bureau subsequently discussed this question with Sir John Russell, and an Allied Technical Advisory Committee on Agriculture of which he is chairman was established in December 1941 to prepare plans for the post-war reconstruction of agriculture in the devastated and oppressed areas of Europe.

At the same time it was suggested that the Association's Division for the Social and International Relations of Science might appropriately arrange a Conference on the subject. The Divisional Committee of the Association willingly gave effect to this proposal. Government Departments gave generous help in the arrangement of the programme and in securing the co-operation of foreign experts.

The Conference was originally arranged to take place in the lecture theatre of the Royal Institution on March 13 and 14. During the afternoon preceding the intended opening, the Association received news of the death of Sir William Bragg, O.M., K.B.E., which befell at the Institution of which he was Director. The Association had to mourn the loss of an ex-president and friend; and the opening of the Conference was necessarily postponed. Fortunately the London School of Hygiene and Tropical Medicine was able to place its lecture theatre at the disposal of the Association in the following week, and there the Conference took place on Friday and Saturday, March 20 and 21.

The thanks of the Association are due to Mr. G. V. Jacks for his kindness in acting as Recorder at the Conference and in editing these transactions.

MEASURES FOR RECONSTRUCTION

Friday, March 20: Morning Session

Opening by Sir Richard Gregory, Bt., F.R.S., President of the Association

At Westminster Abbey yesterday, a great assembly of representatives of all branches of scientific work joined with many other leaders of thought and action in paying a tribute of affectionate memory to their supreme guide, counsellor and friend, Sir William Bragg. This is neither the place nor the occasion on which to attempt to express adequate testimony to his creative work and stimulating influence, but no scientific society has met in this country during the past few days without reference to the loss which the nation and the world sustained when his heart ceased to throb on Thursday of last week. We share in this homage with reverence and pride, while emerging from the shadow with the light of his noble life to direct our aims towards worthy achievements.

Sir William Bragg died at the Royal Institution on the eve of this Conference, which was to have been opened there on Friday morning last, on European Agriculture: Scientific Problems in Post-war Reconstruction. He was present throughout the proceedings of the Conference on Science and World Order held at the Institution at the end of September last, and was interested in the Conference now being held in the penumbra of the sad event which has deprived us of his living presence. We are much indebted to the authorities of the London School of Hygiene and Tropical Medicine for permission to hold the Conference in this hall; and we know that Sir William Bragg is with us in spirit and will long continue to influence all endeavours to advance truth and righteousness in the world of mankind.

During the recent Conference on Science and World Order, it was announced that the British Association proposed to arrange for further conferences or reports upon some of the main subjects brought forward. Among these subjects were the position and outlook of agriculture in relation to human needs and development.

The object of the present Conference is to discuss considered views upon European scientific problems having close contacts with the community at many points—industrial, economic, social and national—all of which have to be adjusted to changing standards and circumstances. Each paper presented to the Conference has a place in the circuit connecting up these points in an effective system of action.

The Royal Institution would have been a very appropriate meeting place of a conference on scientific aspects of agriculture, but for the melancholy event of a week ago. It was in that Institution, at the beginning of the nineteenth century, that Sir Humphry Davy took up the study of agricultural science upon the suggestion of the Board of Agriculture. In 1803 he gave his first course of lectures on agricultural chemistry and continued them for ten successive years. Their substance was published in his book on the *Elements of Agricultural Chemistry*, which became a standard work on the subject for nearly fifty years.

Davy's laboratory researches and studies of principles required to be extended to experiments in the field before their results could become of practical service. Though valuable pioneer work on the principles and practice of agriculture was done in France, Germany, and other parts of Europe in Davy's time, systematic experiments with manures and crops on a relatively large scale were needed to establish them. Sir John Russell, who is largely responsible for the organisation of this conference, is the Director of the oldest experimental station of this kind in the world—that of Rothamsted at Harpenden, in Hertfordshire.

Sir John Lawes founded this station on his home farm of about 250 acres in the thirties of last century to investigate the effects of manures and other influences upon the quantity and quality of different agricultural crops. At that time there was little exact and recorded knowledge of the fertilising values of bones, soot, rags and similar things used on the land by farmers. Bones were the chief of these waste products, but were ineffective in some soils and slow in action in all. It was known that, by treating bones with sulphuric acid, their efficiency as fertilisers was greatly increased, but the supply of bones was too small to make this fact of much practical value.

Lawes discovered that apatite and other mineral phosphates, of which there are plentiful natural supplies, could be used instead of raw bones, and when similarly treated with sulphuric acid, produced a far better fertiliser. It was exactly a century ago that he took out a patent for the manufacture of this product, now known everywhere under the name of superphosphate of lime. Many millions of tons of superphosphate are now manufactured annually and used on farms in most parts of the world.

Modern scientific agriculture, and the uses of artificial fertilisers in systems of farming, may be said to have begun at that time; and it was then that the Royal Agricultural Society was founded with its appropriate motto, 'Practice with Science.' Experiments and observations, whether made in the laboratory or in the field, represent, however, only one branch of verifiable knowledge; and applications of the results depend upon variable economic and political circumstances. This conference is chiefly concerned

with these conditions, and the communications to it should contribute to the solution of a number of important problems arising out of them. It is with much pleasure, therefore, that I ask Sir John Russell, whose wide knowledge of many aspects of agricultural science and practice in most parts of the world is known to you all, to open the conference with his address as chairman.

Sir E. John Russell, F.R.S., Chairman
Agricultural Reconstruction after the War

We do not know when the war will end, but we are quite certain how it will end and we are also certain that there will be great need for reconstruction after it is over. The Germans have an unrivalled power of destruction, and we may be sure that as they are expelled from the countries they now occupy they will, in their wrath, do damage that will stagger humanity. We must assume that they will take all they can, destroy what they cannot take, and leave behind them only famine and pestilence—moral and physical. Diseases of malnutrition, tuberculosis, malaria, typhus will be rife. The task of reconstruction will be exceedingly difficult. Large-scale relief will be imperative, but it will be limited by the available shipping, which we can reasonably suppose will be only small in amount ; for this reason, to ensure economy, it should be centrally coordinated as speedily as possible, and as an integral part of the relief measures, we must get the agriculture of each country going so that food can be produced on the spot, especially the milk and the protective foods necessary to save the children from growing up into diseased and deformed men and women. There is a further reason for speedy and effective reconstruction of agriculture : until it is done, and well done, there can be no peace in Europe : if the peasants are left with bare earth, burnt-out villages, no seeds to sow, no animals to tend, no crops to feed themselves, their children and their fellow-countrymen, they will all too easily fall a prey to the propaganda and the incitements which the defeated Germans will most certainly start as soon as they realise their defeat. We know from experience after the last war how completely helpless the peasant becomes with the destruction of his seeds and implements and animals, and how easily he then succumbs to subversive influences. Our surest way to secure peace is to start the peasants at useful, fruitful work, and the object of this Conference is to discover how best this can be done.

We shall confine ourselves to agricultural reconstruction, because in most of the European countries that must be the basis of national reconstruction : and in order to keep the subject within practicable bounds we shall further restrict ourselves to the initial stages, where agriculture first supplements relief measures, and then replaces them. Long-range policies and activities come into our discussion only to ensure that the first starting up of agriculture may not impede developments known to be necessary, though not immediately practicable. Any plans now made are liable, as we know, to be wrecked by unknown factors in the future. Fortunately in agricultural reconstruction the chief factors are known and plans can be made with more certainty than in some other affairs. We know that the peasants will need seeds, animals, food for animals, implements for cultivation, cottages for themselves, and stables and other buildings for their animals. We know too that it will be necessary to start, as speedily as possible, educational activities and methods of marketing produce at prices that seem fair in relation to the things the peasant has to buy. All these things are certainties, and it is these that we propose to discuss during the present Conference.

We are fortunate in having among us, as welcome guests, men with intimate knowledge of all these various problems. They come from many different countries, and they are speaking at this Conference not as representatives of any particular country, but as recognised experts in their subjects. As the programme proceeds it will become increasingly clear that the leading problems of agricultural reconstruction are in their essentials very similar in all the countries with which we are concerned, however greatly they may differ in detail. This is our justification for proceeding at this Conference on the basis of subjects and not of countries ; and it further renders unnecessary any political discussions, which in any case would be ruled out by the constitution of the British Association.

After the war, and when the iron rations for hungry people have been carried in by the relief organisations, the first and most important agricultural problem will be the provision of seed in order that the peasants may be able to start cultivation. It will be necessary, and fortunately quite practicable, to form an estimate of the amounts of the different kinds of seed required. Collectively we know a good deal about the agriculture of the countries affected ; the chief crops of the different regions and their relative importance in the national economy ; the most suitable varieties, and the best seeding rate. An Allied Agricultural Committee has, indeed, already been formed to give attention to just such subjects and some of the necessary preliminary work to ensure that their deliberations follow practical lines is already in hand. The agricultural experts of each country will be asked to draw up schedules of the seed required for the different regions indicating the crops that should have a high priority. Fodder crops must have a high priority even in the most select list, for it will be impossible for relief organisations to provide food for animals, owing to the enormous bulk required ; and it will be useless to supply the peasants with animals until adequate food is available for them. The task in its final form will be reducible to three items : grain crops for human beings ; vegetables and fruits to furnish the necessary vitamins and minerals ; and fodder crops for the animals. Priority must be arranged both by crops and by regions : by crops, to indicate which at all costs should be sown at once ; and by regions, to show where supplies of seed should be concentrated if there is not enough to satisfy all the demands. Within each region it will be necessary to specify the most suitable varieties, indicating alternatives for the highly probable event that any particular variety may be unobtainable.

Having made up the list of the seeds wanted

the next step will be to arrange for supplies, as far as may be possible. Here it will be necessary to enlist the help of Canada and the United States. In these countries there is at least as great a range of soils and climates as in Europe, and consequently any European crop and any European variety will grow well and ripen good seed in some locality or other. Further, both in Canada and the United States there are emigrants from every one of the occupied countries in Europe; many of these are farming, and it should not be difficult to secure their help in growing seed for their own country. It is possible that many of the desired varieties are to be found on farms in Canada and in the United States; at any rate enquiry should be made, and the probable requirements announced. If it should prove impossible to obtain all the desired varieties, it will at least be possible to get some that will do almost as well. It is highly improbable that all the seed asked for can be supplied, and so the priority list will be needed. But the sooner this work is begun the better, for seed multiplication is a slow business.

Once the fodder crops are sown, and while they are growing, it will be necessary to make provision for supplying animals to the peasants. At the outset it is necessary to ascertain what breeds of animals are preferred in the different regions and why; what other breeds could be used instead, what numbers were maintained before the war, and what was done with the animals. These enquiries should be instituted forthwith. Rather full information is required because it is certain that the numbers available from all sources will be far below the numbers asked for, and drastic cuts will be necessary to make the short supply go round. Preference will have to be given to animals used for milk and for work: both will be urgently needed.

There will be other difficulties. Some of the peasants' varieties may be almost unobtainable, and yet on account of their hardiness and their general suitability to peasant holdings, they may be much better than the standard breeds found on the larger farms. About these standard breeds there will be less difficulty; numerous herds are in existence and multiplication continues. But the peasants' sorts present much more serious problems. Where, for instance, can we find some Polish Red cattle? So far as I know there are none in this country: are there any among the Polish settlers in Canada and the United States? I attach great importance to giving the peasant the breeds of animals that he understands and likes: he will get far more out of them than out of some other sort, perhaps less hardy and more exacting, and in any case outside his range of experience. As soon, therefore, as the list of requirements can be drawn up it will be necessary to inquire where, if at all, the desired animals can be found, and if not, what can best replace them. In any case transport of animals can only be slowly effected; they will be scarce, and shipping will be scarcer, and good breeding stock scarcer still. It is possible that the problem can be lightened by the new technique of artificial insemination, in which it is not necessary to transport the male animal but only the semen, and this can be done over considerable distances when an air service is functioning. The method requires skilful operation, and the necessary training would need to be given to selected groups of men who would later be charged with carrying it out.

Besides these problems of supply several others of administration need early attention. The first of these is settlement on the land, which will be serious in those cases where mass migration has occurred.

In some regions of Eastern Europe the old strip system of farming still survives. The system suffers from the fatal disadvantage that it does not admit the use of modern improvements, and therefore it does not allow of any important rise in the standard of life of the peasants. It has other defects also and there is no question that it must go. The period immediately after the war will be too crowded with urgently pressing problems to permit of careful working out of schemes of land reform, but so far as is possible the scattered strips should not be resuscitated: instead, the land should be set out in compact holdings, sufficiently large to maintain a family in good health. This consolidation of the holdings will open the way to technical improvements in agriculture, as and when it becomes feasible to carry them out.

Another administrative activity must be started as early as possible. After the war conditions are likely to be so difficult that the peasants' task must be simplified in every possible way. Peasants must be able to devote their whole time to food production; they should not need to worry themselves about credits or marketing. The best agencies for taking charge of these activities are co-operative societies, and it is very desirable that these should be set up as early as possible after the war. They are, in my view, the best agencies for supplying credit to the peasants, and for taking over the peasants' produce as soon as it is ready. Associated with them should be a staff of instructors. It will be neither possible nor desirable to get back entirely to the old peasant farming, and not infrequently it may be easier to supply an improved article, instead of the old one. It will therefore be necessary to have as efficient a staff of agricultural instructors as it is possible to get together, and to set up in the villages something like the Russian hut laboratories which serve as their centre of action.

Although this Conference is concerned only with immediate problems of agricultural reconstruction, we must recognise that no country can live on agriculture alone once its cultivable land has all been brought into cultivation. The peasants increase in number more rapidly than the land increases in productiveness, and some provision has to be made for the surplus population. In the old days, pestilences and famines periodically solved the problem by carrying away numbers of people. But before the war, and we hope it will again be so after the war, these no longer operated as checks on the population and there was always a surplus agricultural population. A generation ago this surplus could migrate to newer countries, but in recent years emigration has become much more difficult and some other solution has to be found.

Two possibilities have been tried. Agriculture

has been intensified and directed towards market gardening, fruit growing, poultry keeping, etc. These require far more men per 100 acres and they frequently return more per man-hour than the ordinary forms of agriculture. By adopting intensive methods Holland, in spite of its small area and large population, had before the war a very high standard of life. Denmark and Norway had also been successful, and Poland was developing intensive forms of cultivation as a way of absorbing her surplus peasant population.

This method, however, is of only limited application, and succeeds only so long as there is a good market for the produce. We hope after the war that the nations of Europe will endeavour to adopt the higher standards of nutrition now so widely advocated; this would mean a great extension of the more intensive forms of agriculture and the employment of more men on the land with the possibility of higher remuneration. But here, as in ordinary agriculture, the limit is ultimately reached, and still the peasant population will go on increasing.

Beyond this stage the only way out seems to be the development of industries. In Great Britain we often think of agriculture and industry as conflicting interests. In the crowded peasant countries of Europe they are not conflicting, but complementary: apart from emigration, industry offers the only outlet for the surplus population after agriculture and intensive cultivation have absorbed all the men they can take. Hence while this Conference is not concerned directly with industrial reconstruction we recognise that this will ultimately determine the fate of the surplus peasant population: whether they will be compelled to stay on the land or be able to migrate to the towns.

I have left to the last the question of finance: who is to pay for this restarting of agriculture in Europe? This is a question for most serious study. There will be some nations which may be able, out of their liquid resources, to help themselves; there are others who will need very considerable assistance from more fortunate countries overseas. How this financial assistance is to be mobilised is a matter for the financial experts, but that it must be done there can be no doubt. Without adequate financing the entire fabric of agricultural reconstruction must inevitably fall to the ground. Then fresh troubles would certainly arise, for hungry men neither think clearly nor act wisely.

Mr. Kenneth G. Brooks

Some Problems of the Post-war World

ALTHOUGH the problems of the post-war world will be on a much larger scale than those which followed the last war it is possible that we may learn something from a consideration of the experiences of those who were intimately engaged in helping to rehabilitate Europe in 1918 and succeeding years. It is possible that the countries which suffered most severely during the last war will again be among the most devastated areas and it may be well to look closely at their problems. Unfortunately, we must expect the problems to be greatly magnified this time, as many countries which were able to help replace the losses in belligerent countries in 1918 are now overrun. The double significance of such loss must not be forgotten—the loss suffered by the area itself and the loss to those who depended on it for supplies.

The Society of Friends had centres of activity in nearly all European countries during and after the war of 1914–18 from the Pyrenees to the border of Asiatic Russia. Its financial resources were on a small scale as compared with what will be required this time—large as they seemed then. Its funds collected in England alone amounted to almost two and a quarter million pounds, which owing to the methods of using them did the work of a capital of four to five million. Small as these figures appear in these days, they may justify our considering the work of the Society as a miniature of the work to be done when this war ends.

Out of its experience we can draw four major principles:—

(1) that it is impossible to separate relief from rehabilitation;

(2) that short and long term policies in agriculture must run concurrently;

(3) that international co-ordination of monetary and fiscal policy is an essential to rehabilitation;

(4) that personnel must be provided on a generous scale and must have special qualities of human sympathy in addition to professional and practical qualifications.

In most countries in Europe over half the population is engaged in agricultural pursuits, and in many the percentage is as high as 80. It is quite evident—and should be accepted as the basis for a European plan for agriculture—that there are no prospects of lasting prosperity for Western Europe if the agriculturists of Central, Eastern and Balkan Europe are not prosperous. We have heard of the four hundred million potential customers in China; there is no need for Europe to go so far afield; she has as many potential customers close at hand. I mention this well-known fact to emphasise the need for treatment of this problem on a European basis. In fact the shortage of shipping in the immediate post-war years may give an excellent opportunity to treat it thus. This will entail the international co-ordination of monetary and fiscal policy, for the financial crises from which many countries suffered time and again after the last war hindered the progress of agricultural rehabilitation.

Important as it is to restore agriculture as soon as possible, much will need to be done before returning refugees—of whom there were eight million from Congress Poland alone last time—can be re-established on their land. Modern warfare has given the lie to the old adage that the soil cannot be destroyed. It is, furthermore, useless to have a plan which does not take into account the effects of famine and malnutrition, of typhus, typhoid and malaria, not merely on those who do return but in reducing through death or incapacity the man-power available. The primary needs of the population—food, clothes, shelter—will have to be met before an agricultural policy can hope to be effective—for example, last time in many districts the staple food was powdered grass mixed with some flour, and a man can do

little ploughing on such a diet. One advantage of the Friends' method of tackling the difficulties they encountered was that plans grew from step to step. Yet in view of the magnitude of the problem this time, it would be unwise—in fact criminal—not to have plans prepared beforehand, taking into account all the contingencies likely to arise. As an example of the necessity for a change of plan as knowledge of conditions developed, I will quote only that at first children alone were fed by the relief workers, but it soon became obvious that unless adults also were fed, the children would soon be orphans and that there would be nobody to do the necessary work to obtain crops and food the following year. Side by side with the relief work it will be necessary to undertake as part of the agricultural policy a vast programme of public works, for roads, bridges and railways will be in a state of disruption and disrepair. This part of the programme might be undertaken as a relief programme for townsmen whose interests are equally in the rapid rehabilitation of agriculture and who tend to be fed at the expense of the agriculturist on whom the towns rely for their supplies in succeeding years. The Society of Friends in its relief and reconstruction activities has always started from the belief that the man is more important than the soil and that the restoration of the individual's self-respect and self-reliance, his mental and spiritual health, are of paramount importance, and so has placed considerable emphasis on the value of personal contact between the relief worker and the inhabitant. Such a policy requires a larger personnel than does the mere administration of a scheme, but the Society's experience leads it to believe that a sympathetic personnel provided on a generous scale and able to work side by side with the farmer on his own land is a great help in the re-establishment of community life and is of real value in helping the farmer to face his new problems and in getting him to accept new schemes and methods. It may be necessary for all the post-war work to be financed from public funds, but it is to be hoped that any schemes which may be devised—and they will have to be on a continental scale—will take into account that the farmer, on the Continent as in England, is an individual—and perhaps more of an individual than any other human being.

Let us now come to some of the specific problems with which agriculture is likely to be faced. From reports already available it appears that famine and disease are widespread in Europe, and these conditions will necessarily be aggravated as the war continues. Cholera, malaria and syphilis are diseases which must be dealt with immediately if progressive deterioration of the farming community is not to take place. Tuberculosis, which is now increasing in Europe and which increased by 67 per cent. in Germany between 1914 and 1918 and by a much higher percentage in other areas, saps the energy of the community, making adequate sowing impossible. Nor can the psychological effects of famine and disease on an epidemic scale be over-estimated.

It is to be hoped that re-planning of villages will be done on a regional basis, and it should be borne in mind that to the devastated area of Central, Eastern and Balkan Europe must be added this time vast areas of Russia which have been subjected to the scorched earth policy. The best and quickest solution to the problem of rehousing may be the importation of sectional buildings which could be set up quickly and save the time which would otherwise have to be given to cutting and carting timber from forests, often many miles away from villages. During the war years Friends put up workshops and sawmills in France to make these sectional buildings, but working on the spot and with so many other things to do they made only hundreds where this time hundreds of thousands will be required. It may be worth while to establish large workshops for mass production of standardised buildings near needy areas to save transport. These buildings should be of such a design that when no longer needed as temporary homes they can become storehouses or barns for the farms. Much of this work should be done before the refugees return, for houses are vitally important not merely because of the harshness of the winters, but as a help in combating the diseases which result from bad housing conditions.

Transport was a considerable problem because of the general deterioration of roads and bridges and the shortage of horses. Cars were not as plentiful as they are to-day, but this very mechanisation of the countryside will greatly enhance the difficulties of transportation in post-war Europe. The difficulties of getting petrol and spare parts will make the horse once again of paramount importance to agriculture. Where petrol is available it may be possible to obtain tractors and vehicles from military dumps as was the case last time, when often one good machine was made from three or four old ones. Owing to the serious decline in the number of horses during the pre-war years, a decline which in some countries was catastrophic—Norway had 10 per cent. fewer horses in 1938 than in 1918, Rumania 20 per cent. less than in 1916, and Russia 50 per cent. fewer than in 1930 when the number was already considerably less than that for 1916—transport difficulties will be enormously enhanced. After the last war in many areas only one-quarter of the pre-war number of horses remained, and in some areas the number was in 1919 only 15 per cent. of the 1914 figure. Famine and warfare will almost certainly have made the losses greater still this time. The provision of horses will again be a vital necessity, but this war has involved the countries from which horses could be obtained in 1919 when Friends fetched horses from various parts of Europe and even brought a thousand from Turkestan. To meet the transport problem they even imported camels. In Poland eleven hundred horses were borrowed from the Government and eventually bought for 26*s*. each. Some were sold to the peasants but most were organised in ' horse columns ' for use in ploughing large tracts of land for common use, and for hauling timber during the winter. During the ploughing season horses were loaned to farmers on a basis of two days' hire for one day given to ploughing the land of a widow or of a family with no member capable of doing the work. In this way 24,000 acres were ploughed in one season to ensure to 60,000 people a crop

in the following year. This co-operative use of livestock worked very well, anxious as the peasants were to buy their own animals, and was far more satisfactory than getting farmers to lend their own beasts for ploughing and tractor-hauling. The co-operative ownership of tractors and machinery was not so satisfactory, for the difficulty of making anybody responsible for repairs often ended in the machines lying idle.

It is important to get ploughing started as soon as possible, and much of it may have to be done by the workers or organisers because the farmers are just too weak through disease and famine to undertake any strenuous work. This seriously limits the acreage that can be sown during the first year and makes it necessary either to plough an equal amount for each inhabitant or to organise the village on a collective basis. This need to reorganise the social order of the village may present no difficulties after this war, as the principle of co-operation is better understood and many of the farmers will be acquainted with the collective system of farming. It is, however, important that agriculturists going out to organise reconstruction should understand the systems under which farming has previously been done in the areas in which they are to work.

Farm implements of all kinds will have to be provided, and this may be equally difficult this time, as even in areas not actually touched by war few new ones will have been bought during the war years. Ploughs, mowers, binders and threshers as well as spades, sickles and scythes will be required—the last especially for clearing the ground. Many of these smaller instruments were bought when military stocks were disposed of. In some parts of Europe which will need help the time between the end of summer and the beginning of the winter snow is too short to allow of proper ploughing with horses even in normal times when the available labour is healthy, and here the situation will be very serious unless tractors can be provided. An important factor in the number of acres ploughed is the loss of man-power owing to war and disease—in one area the acreage dropped for these reasons from six million in 1914 to one and a half million in 1920, and of course the fall in the crop was greater still as the effects of the war made themselves felt among the population. It is obvious that when tractors can be obtained infinitely better protection against famine and drought is given, as the superior tillage they make possible may save the crop even in a bad year. Some time ago Russia experimented with sowing by aeroplane—the seed being sown on to the snow and sinking into the moistened earth as the snow melted : it was not a great success, but it may be worth considering for post-war use when area sown and lack of man-power will be of such immense importance. It may be possible also to use this method for distribution of fertilisers and vermicides as is done in the United States, for the increase in vermin due to lack of care during the war years may mean the loss of crops before they ripen. A small reward for skins helped to rid an area of pests at a time when the failure of the crop meant certain death to the villagers. In one area 350,000 skins were brought in at a cost to the mission of 20,000 roubles—a part of which was regained by the sale of the skins, but the money loss was easily offset by the saving of the crop.

A prime necessity will be the rebuilding of the herds : Friends bought cows and bulls in Switzerland and Holland, but the sources of supply are likely to be few after this war, as already before war broke out the policy of restricted output was having an effect upon the herds in Denmark and other countries, and during the war there will be a serious decline in the number of cattle because of the impossibility of importing fodder. Russia has increased her cattle to a remarkable extent in recent years, but it is doubtful whether she will have any available for export in view of her own probable losses. In view of the general impoverishment of pasture due to lack of fertiliser and manure it will be essential to import fodder in sufficient quantity to last until the first crop can be gathered. Modern developments of insemination will make the re-stocking of herds easier and save some of the difficulties which the purchase of bulls in distant countries gave.

During the first year all the seed for sowing must be provided for the returned inhabitants. This is a stupendous task, for even in the areas with which they were concerned Friends estimated that 80,000 tons of seed-corn were required to sow 50 per cent. of the pre-war acreage. In this connection careful thought must be given to the types of seed suitable for different areas. For instance, it was found in 1920 that only European grains were of any use in Poland. Every year thousands of families were provided with garden seeds—this may seem of little importance, but they were of great value in the change of diet they provided. Care must also be taken so to organise the planting that the greatest possible amount of food is obtained for the people and plans must provide for the different seasons at which the war may end.

An important feature of the long-term policy is the establishment of agricultural schools. Friends first set up gardening and agricultural schools in Poland because it was found that about 50 per cent. of the war orphans were owners of land : there will also be numbers of young people with no training at all or whose training was interrupted by the war. It is essential to the future of agriculture that skilled men should be trained.

The method of financing all these ventures was that used by Friends in their relief and reconstruction work after the Franco-Prussian war of 1871—the principle being that work and worker should be brought together, thus enabling the people to create wealth by their own efforts. By accepting payment in kind for goods, seed and livestock supplied, several prosperous communities were built up without the burden of debt which money payments always place on the shoulders of the farmer, and money was kept the servant and never became the master of those who needed it. On one occasion returns from the sale of corn were invested in 176 sheep, the sale of which enabled 75 tons of fertiliser to be bought, and so on—the wealth thus remaining within the community which had created it. Similarly co-operative buying of implements, stock, seed and clothes was organised, and the healthy societies thus formed were handed over

to the communities when Friends had completed their work. Several governments lent money at a low rate of interest to co-operatives, and this could be done on an international scale. On one occasion payment for cows in Austria was to be invested in cotton-seed meal to increase the yield of milk, but the collapse of the exchange prevented it. That is liable to happen with disastrous results for farmers unless exchange rates are stabilised as an essential part of the agricultural programme and not left to the whim of financiers with no particular interest in the human beings dependent on the market value of their crops.

Such were some of the problems faced by Friends after the last war: many of them will appear again at the end of this war. Some of the difficulties of those days will be easier, for the peasant cultivators of Europe have developed considerably during the last twenty-five years. Some will be greater, for the war has spread its shadow over a wider area and its harshness has bitten still deeper into the soul of Europe. The tasks will need men who specialise in the impossible, but by giving earnest thought to the requirements of a new world, we can at least arm them with a plan and a training which will help them to overcome the difficulties.

H.E. M. Mikolajczyk
(Polish Deputy Prime Minister and Minister of the Interior)

Post-War Agricultural Reconstruction in Poland

THE drafting of a plan for post-war reconstruction after the victorious conclusion of the war must be begun immediately, as it is the only means of securing a just and lasting peace. The working out of such a plan is a tremendous task, requiring time and an adequate specialisation of the work to be done.

We may say that the German policy in Poland and other conquered countries has the following objects :—

1. To secure to the Germans the position of the master race.
2. To destroy other nations living in what they call their own *Lebensraum*.
3. The nations which are not to be destroyed for the time being are to be the slaves of the master race.
4. Taking into account the possibility of defeat, they are making such changes now as will bind the conquered nations once and for all to the German economic organism, which of course will lead to their ultimate political vassalage.

The Allied plan should have the following main objects :—

1. To secure the freedom of nations and individuals, and their right to self-determination.
2. Immediate assistance after the conclusion of the war.
3. The raising of the standard of living in these countries.

The right to freedom and self-determination was defined in the Atlantic Charter, and in the Washington Declaration signed by twenty-one nations.

The immediate assistance, the forms of which I shall discuss later, ought to provide the exhausted and starving nations with the primary necessities at once, to save them from internal strife, and to raise the production capacity of their economic resources. The dependency of these countries on Germany should be immediately terminated: in case of need, their present production, now adapted solely to the demands of the Third Reich, should be swung over to supply other needs.

The raising of the standard of living in these countries—in other words, the raising of their productive and consumptive capacities—is closely connected with the problem of the exports and imports of these countries, with financial assistance, with supplies of raw materials, with the industrialisation of the agricultural countries, with the spread between agricultural and industrial prices, with educational facilities and technical training for youth, etc. I shall speak only about immediate assistance, though I realise that long-term policy problems are so closely interwoven with immediate needs that no clear-cut division can be made between them.

Here is a general outline of the agricultural situation in Poland, which will give us a clue as to the means to be adopted for post-war reconstruction.

What were the achievements of Polish agriculture in the twenty years between the first and second world wars? For agriculture, this is a very short period—it does not even comprise the life of one generation—however, it was a period of rather violent changes in the economic and social structure of our farming community, of changes which in other countries took a much longer time.

To realise the extent of these changes, it is necessary to indicate briefly the position as it existed before the first world war.

Of course, every part of Poland was merely part of the whole territory of the partitioning powers. Then as now, Germany treated the western provinces of Poland as a source of food supplies, hampered the development of industry, and forced the surplus population to emigrate to Western Germany.

In the Russian part, a small industry, working mainly for the Russian market, was founded, while agriculture, stifled by the competition of Russian agriculture, was unable to make much progress or to employ its surplus population.

The position in the Austrian territory was the worst: for strategic reasons, the development of industry was stifled, while agriculture could not compete with the fertile Danubian provinces. Here the poverty of the peasants was past belief, here too over-population of the country, especially when taking into account the lack of fertility of the mountainous soil, was the greatest.

In short, the Polish territories were deprived for a hundred and fifty years of all the blessings bestowed upon other countries by the nineteenth century, the century of swiftest economic progress and accumulation of capital.

The tasks which confronted Poland after her restoration were immense. It was impossible to improve the situation of Polish agriculture by agricultural measures alone. The burden of

five million men and women without work in the rural areas could be alleviated only by simultaneous action along three lines: radical alteration in the agricultural structure, the transfer of part of the surplus population to the towns, and an intensification of production methods, to meet the increased demands of the home markets and export needs.

The most important change in the agricultural production itself was the change from extensive corn-growing to more mixed forms of grain-growing and cattle-raising. I should like to stress this change because in spite of none too favourable conditions (a comparatively small rainfall), agriculture in Poland has shown great capabilities for expansion in the direction of cattle-raising. From an economic point of view this is the most advisable line of production for small peasant holdings, since it permits full use of the available labour. Between 1921 and 1939 the numbers of livestock of different kinds increased by from 30 to 60 per cent.

Grain-growing in Poland was affected by the rapid expansion of cattle-raising, and by the increasing use of agricultural raw materials in the expanding industry. During the last ten years or so, the area under root-crops, potatoes in particular, was extended, and so was the area under fodder. A larger part of the grain crop also, particularly of barley and rye, was used for fodder in the farms themselves. I should also note the extension of the area under production of flax, hemp, rape-seed, tobacco, fruit, etc.

We should not forget that these changes took place in a period of low agricultural prices in the world markets and therefore this evolution of Polish agriculture was achieved only by greater efforts and improved farming methods.

The co-operative movement developed highly satisfactorily. In 1936 there were 2,659 consumers' co-operatives in the villages, 392 industrial and trading co-operatives, 1,323 dairy co-operatives, and 3,649 credit co-operatives, with a total of 1,700,000 members. The co-operative movement played an important part in the concentration of the supply of agricultural products—it fulfilled a task which private trade, with insufficient capital, could not attempt, and it was a means of educating the peasant.

All this of course was entirely inadequate and short of what the country really needed. However, these results could be achieved only because of the growth of education amongst the peasant youth, the activities of the agricultural schools, of the agricultural centres, of the associations of countrywomen, of the social workers in the rural areas, and of the autonomous territorial and agricultural bodies.

If I mention all this, it is in order to stress, not without pride, the progress and maturity of the Polish peasants, who, in spite of difficult political, social and economic conditions, became active citizens of my country. Their maturity is also proved by the splendid way in which they behaved in 1939, and are now behaving under the occupation.

War came, and then the occupation. During this period we should distinguish several stages through which the Polish countryside had to pass:—

1. The period of actual fighting and destruction caused by it.
2. The division of Poland into the so-called incorporated areas, and the General Government. The policy of destroying the Polish nation in order to make room for the Germans, and the exploitation in favour of the master race.
3. Poland as a rest-area for the reserves of the German Army in the West.
4. Poland as a springboard for the German Armies on the eve of the attack on Soviet Russia.
5. Poland as a 'hinterland' for the German Eastern Front.

German policy has been characterised by slavery, oppression, terror, robbery, exploitation, disorganisation of industries which might compete with those of Germany, the adaptation of production to German needs, and the harnessing of man-power to the German war and economic machine.

I draw certain conclusions, which must afterwards be thoroughly discussed and applied to the problem of reconstruction.

The following elements must co-operate in the work of reconstruction itself:—

1. The nations of the occupied countries, and their governments.
2. The Germans, in the form of reparations payments.
3. The allied States, as auxiliary aid.

The liberated nations must choose the economic system which they intend to make the basis of their reconstruction. Polish agriculture, judging by details received from Poland, wants to build up in the future on the basis of healthy, profitable and productive individual peasant farms, worked by their owners. The idea of an agrarian system based on the peasant's own labour and private ownership, restricted by public interest, will, it seems to me, play an important part in the search for a new social economic order, as being a solution which rejects both the liberal-capitalistic economic system and the totalitarian state-nationalised national economy.

The nations and their governments, after choosing the basis for their economy, must quickly and directly solve the problem of the agrarian system, its mechanisation and fertilisation, the raising of production and the organisation of the marketing system, dairy-farming, the state and social organisation of agriculture, local government, education and professional training, agricultural industry, processing and canning factories, and the basic principles of economic policy. To this end they must have an immediate plan and a long-term plan, backed by international co-operation.

Briefly I must state that we fully realise that the chief burden of reconstruction will necessarily fall on the shoulders of these liberated nations, and the elasticity and organisation of the system will very much depend upon them.

The principles of justice demand that the whole burden of reconstruction should fall on those who have caused the devastation. We cannot forget this, especially as the Germans show the road which they themselves have taken, and are demanding further reparations from those countries which they attacked and are exploiting.

German economic life is not fundamentally destroyed, but the exploitation of the production of the occupied countries and their human resources carried off to the Reich are assisting in Germany's development.

None the less I am afraid that the world will be quickly ready to forget that over a number of years the Germans succeeded in extracting some 90 milliard marks from their own nation for the preparation of their war machine, and that it is prepared to forget the devastation caused and the justice of recompense for that devastation.

In materials received from Poland Polish agriculturists consider that the Germans should pay for the immediate restoration of agriculture in Poland by reparations, consisting of livestock, thus making up for the losses, and also of seed, fodder, and agricultural implements, and by the provision of demobilised motorised units, which will replace the terrible losses in draught animals.

But we have to make the choice between renouncing all reparations and leaving these countries in misery and complete dependence upon German economic life, with the prospect of a new war or of German hegemony despite her loss of the war ; or of renouncing reparations and having all assistance covered from the resources of the Allied States themselves ; or of having German reparations plus immediate assistance for a swift restoration. The destruction already caused by the Germans exceeds all possibility of its being covered by immediate German reparations alone.

I consider that this aid from Allied resources will be by no means gratuitous, but that the Western democracies will assist these nations to live, just as the American Lease-lend Act is to-day helping in carrying on the war to victory.

At present this assistance cannot be summed up in definite figures and lists of articles, for these things depend upon how long the war lasts, where the losses will grow heavier, and the time of year at which the war operations end.

The primary issue in Poland will be the supply of foodstuffs, grain, meat and fats to the population, and their provision with the necessary clothing and footwear. The feeding of the entire population of a country has a double importance : it provides the people with the necessary means of existence, and also during the critical period it frees the rural areas from the necessity to supply foodstuffs ; it leads to the rural areas being better provided with foodstuffs, and indirectly, by hastening the independent restoration of agricultural production, it increases the quantity of grain and potatoes in husbandry, which is the basic condition of a restoration of the livestock situation.

The second very important problem of restoring the livestock can be tackled in several ways simultaneously :—

(*a*) by supplying the farmer with a certain quantity of livestock from abroad, in which question the climatic and transport conditions will have to be taken into consideration ;

(*b*) by providing him with cock chickens, bulls, stallions, sows and boars, and heifers ;

(*c*) by protecting him from the necessity to sell his livestock, and especially by enabling him to keep his young stock on the farm. This entails his being recompensed for the loss incurred through not selling, and the reduced supply to the market must be made up by further imports of meat and fats.

The third important problem is that of draught animals and transport sources. This is of enormous importance, especially because the devastated railway transport will during this very period be greatly overloaded both with the conveyance of material aid, and also in consequence of the necessity to transport large quantities of coal throughout the country, in order to put a halt to the thriftless exploitation of the forests.

Here arises the question of railway rolling stock, motor transport and tractors, in order to complement the diminished stock of draught animals in agriculture.

The raising of agricultural production, after foodstuffs have been provided and reserves of grain allowed to remain in the villages, will then demand a rather smaller quantity of seed grain as well as special seed, such as clover, lupin, etc. A swift rise in harvest yield can be achieved by the use of artificial fertilisers, and Poland especially will require imports of nitrogenous and phosphate fertilisers.

Then comes the question of restoring the agricultural inventory and machinery owing to the destruction of the existing inventory, through inability to replace worn-out instruments, etc. In the sphere of agricultural machinery it will be necessary to obtain quantities of complete threshing machines, harvesters, binders, etc., and also complete larger installations such as dairy refrigerators and separators, machinery for agricultural and dairy processing industries, and also material required for the further electrification of the country.

The problem of credits is bound up with the restoration of the war devastation of buildings and with the development of the agricultural system and new construction, and is therefore bound to occupy a very important place in this list of indispensable necessities.

In view of the predominance of disease and epidemics the question of urgent medical and sanitary aid must also be taken into account.

There is a further problem, which is quite distinct, namely, that of assistance in returning the evicted agricultural population to their farms. The question of transporting these people from the heart of Germany, and also from the General Government, their supply with implements and livestock, where these are missing from the farms to which they return, and also their supply with the necessities of life, until their own farms are producing for their needs, must be given special consideration.

I have presented a very general statement of the necessity for urgent assistance, on the basis of the present situation and of the needs which can be more or less accurately expressed in terms of statistics, which can be included in the urgent plan of operations for the restoration of agriculture after the war. Another important question is that of organisation. The definite needs of each country must be drawn up by the competent persons of each State, and thereafter there must be a joint meeting with our hosts, in

order to consider methods of organising this assistance, its assignment and purchase, its supply and the means of payment.

All this goes to indicate that the urgent plan must be linked up with a long-term plan, rendering it possible for these nations to acquit themselves of their obligations incurred through this assistance; a plan which in the last resort guarantees Europe complete freedom, peace, and happiness for its peoples and nations.

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Marketing and Prices

1. *Pre-War Conditions and Problems.*—With 70 per cent. and more of their active population engaged in agriculture, the importance of agricultural prices for the countries of Eastern and South-east Europe can hardly be overstressed. The idea of price is used in this context in its widest sense, namely as the terms of exchange at which the product of agricultural labour can be exchanged against other products or used for redeeming obligations fixed in terms of money.

In the inter-war period an important factor in world agriculture was the price of wheat, which was closely linked with the prices of all other agricultural products. In this period, three major factors affected the prices secured by agricultural producers of Eastern and South-eastern Europe.

(1) The first was the considerable expansion of agriculture in overseas countries, which, owing to more favourable natural conditions as well as to very up-to-date methods of farming, were able to operate at lower production costs besides bringing to the market products of higher quality and under better marketing conditions. It is perhaps interesting to show how the export trade of wheat of the European agricultural countries developed during this period, as compared with pre-1914. Thus, the average net export of wheat from Hungary, Rumania, Jugoslavia and Bulgaria in the years 1909–1913 totalled 106 million bushels; this average for the years 1922–1926 reached only the figure of 34 million bushels. During the same periods the net export average of Canada, Argentina, United States of America and Australia increased from 345 million bushels to 691 million bushels. It must be added that at the same time world prices of European products were considerably lower than those of better-quality overseas products.

(2) The second factor which affected European agriculture was the shrinking of European markets due to a policy of self-sufficiency adopted in many industrial countries which in pre-war days had been important buyers of agricultural products.

(3) The third factor was the growing discrepancy between agricultural and industrial prices which became very noticeable after 1929. As a result, agricultural countries of Eastern Europe had to contend with increasing difficulties in order to maintain a certain amount of foreign trade which they could achieve by artificially pushing exports and at the same time curbing imports. The gap between production costs and world market prices had to be bridged by direct or indirect subsidies.

The impossibility of finding outlets at remunerative prices led to a rapid decline in national income, and an all-round fall in purchasing power. This not only narrowed down the internal market for agricultural products, but had also wide repercussions on industrial countries whose products could no longer find outlets in their former markets.

2. *Problems likely to occur owing to the War.*—Among the various problems likely to arise in South-east Europe as a result of the present war, two enter into the immediate scope of our investigations.

(1) The end of hostilities will find European agricultural production adapted completely to German needs, irrespective of the suitability or otherwise of the newly introduced cultures to climate and soil conditions.

(2) There will have been a large-scale destruction of capital equipment, including livestock.

After the first period, which will be necessarily one of relief of immediate shortages, the next problem will be the re-adaptation of production from its war-time dislocation.

3. *Post-War Agriculture.*—As agricultural products are likely to be in wide demand, the incentive for increased production will not be lacking.

This may well provide an opportunity for a long-term reorganisation of agriculture with a primary aim of securing higher returns for the producer. It would provide, moreover, an opportunity for the realisation of that joint planning by agricultural countries which repeated efforts before the present war had been unable to achieve. It must be obvious that any long-term planning on the part of the agricultural countries of Eastern and South-east Europe calls for co-ordination of agricultural and industrial policy among those countries. A return to the pre-war conditions of independent national policies with self-sufficiency as the main aim would soon land us in the same chaos as existed before 1939.

The first requirement of an agricultural plan is the re-adaptation of agriculture with a view to securing the producer an adequate return for his labour and, at the same time, with a view to producing the kinds of goods for which the demand is great and, therefore, markets are readily available.

Such a plan demands a widespread specialisation of production according to climate, soil and labour conditions. For countries with agricultural under-employment—and all agricultural countries of Eastern and South-east Europe enter into this category—the obvious solution lies in an intensification of agriculture—that is to say, a change over from the excessive production of wheat and maize to the production of industrial plants, fruit-growing, livestock breeding and dairy farming.

Parallel with this diversification of agricultural production, agricultural processing industries must also be developed. Such a policy would ensure not only a higher productivity of labour and, therefore, better incomes, but would also radically and favourably alter the export position. It would bring about the reduction and possibly the complete disappearance of the uneconomic export of cereals and its replacement by processed goods of much higher value and, therefore, in smaller quantities.

The marketing policy of the future should be planned along such lines. Far from being merely a question of export selling for certain given surpluses, it should be a flexible plan of joint organisation beginning from the allocation of production among the various countries to the distribution and marketing, first within the association of the agricultural countries, and then in relation to joint requirements outside the area. The distribution and marketing side in itself calls for far-reaching transformations at each successive stage.

At the producer's end there must be standardisation according to jointly established grades. He must have storage facilities, together with adequate credit arrangements, so as to secure 'orderly marketing.' By cold storage and processing facilities it would be possible to eliminate waste in perishable foodstuffs which, paradoxically enough, is highest in the poorest agricultural countries of Eastern and South-east Europe. Improvements in distribution and, more especially, in internal and external communications would reduce the excessive costs of marketing and would ensure a more economic return to the producer. But planning can, and indeed must, go even further. It can increase effective internal demand by organising and directing consumption, through education, price policy and other means. For it must not be lost from sight that in the last analysis it is the widening of the internal market which is the prime condition for any economic development.

In the field of exports, joint planning, standardisation and selling should enable the agricultural countries to market their products at equalised and, it may be hoped, better prices. The participating countries could institute a joint market research, following closely trends of demand and adapting export production both as regards quality and quantity to changes in demand.

From this necessarily short survey of a vast field it will be seen that the problem of prices and marketing cannot be approached separately, but only within the widest scope of general economic policy and, in fact, political reorganisation. Nor can it be separated from the overriding problem of under-consumption, so acute in the countries under review. It will be the noble task of those in charge of reconstruction in Eastern and South-east Europe to eliminate, by adequate organisation and capital investments, agricultural under-employment and the so-called production surpluses on the one hand and the prevailing widespread malnutrition on the other.

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A Glance at Belgian Agriculture : The Importance of Intermixing Farm and Industry

As one of the most highly industrialised countries, Belgium is rarely thought of as an agricultural country. And yet, agriculture with all its ramifications is often described as our first industry both from the point of view of capital invested and the value of its production.

Taking farming itself, 17 per cent. or 635,000 of our total active population (3,750,000) are permanently engaged in agriculture. If we add to this figure those people who are doing agricultural work as a casual or seasonal occupation, the total active agricultural population would be about 800,000 or 20·5 per cent. of the total active population of the country.

Belgium is the most densely populated country in Europe. In relation to her agricultural land she is preceded only by Switzerland but remains far ahead of other countries in Western Europe: 195 people per 100 acres of agricultural land (in 1930) compared with 137 in the Netherlands and 112 in Norway.

Agricultural Labour.—Although we have in Belgium over 13 persons engaged in agriculture for every 100 acres of farmland, hired permanent labour employs only 66,000 people, which means that nine-tenths of the permanent agricultural workers belong to the household of the farmer. Holdings of up to 25 acres are farmed almost exclusively with family labour and the proportion of hired labour increases with the acreage.

Women represent 25 per cent. of the hired labour and 44 per cent. of the family labour.

The wage paid to agricultural labourers has always been very low in Belgium. No wonder that, with the additional attraction of industry and town, agricultural labour was becoming scarce and the farmers were being faced with a difficult problem.

Small Scale Farming.—Belgium is a country of small farms, one of the main reasons being the pressure on the land of a dense rural population. Per head of the active agricultural population, Belgium has only 7·25 acres of arable land, compared with 9·25 acres in Holland and 37·25 acres in New Zealand.

According to the last agricultural census (1930) there were over 1,131,000 agricultural holdings for a total area of just under 5 million acres of agricultural land (nearly half of which was under grass). Of that total, nearly 839,000 holdings are under 2½ acres and their average acreage does not attain half an acre. Moreover, it appears that only 12,000 of these are full-time market-gardens, the occupiers of most of the remaining 827,000 holdings having some other principal occupation. A certain number (the most numerous group) are industrial workers employed in the district, whilst a second group (estimated at about 40,000) is formed of very small farmers who find a supplementary income either as permanent labourers on larger farms in their neighbourhood, or as seasonal workers on near or often distant farms.

These part-time holdings are a special feature of social conditions in rural Belgium and have created a small social class which for one part is semi-industrial and semi-agricultural, and for the other consists of people who besides farming on their own account are at the same time wage-earners. Nowhere, I think, is industrial and agricultural life intermixed to the extent that it is in Belgium. This class of part-time farmers is not limited to the small-holdings of under 2½ acres; there may be as many as 30,000 in the acreage group of from 2½ to 12½ acres, but these are presumably small farmers forming the second group of the part-time holdings, and not the half-industrial half-agricultural group whose holdings mostly do not exceed half an acre.

The description of these holdings as part-time should not, however, convey the idea that the

occupier works at certain times in industry and at other times on his small farm. There are, of course, such cases. But the real characteristic of our part-time holdings is that the family—not the individual occupier—is split up between industry and agriculture. The father may be working in town, whilst the mother is running the holding with the help of a son, or the son or sons may be employed in industry whilst the father works on his little farm.

Moreover, one should not think of these part-time holdings in terms of garden cities or allotments. Allotments are a different thing altogether. And although in certain districts there has been created what might be described as garden cities, or agglomerations of small-holdings, the large majority of part-time holdings are scattered all over the country side.

This has been made possible because the industrial centres of Belgium (there are about a dozen) are themselves fairly well dispersed over the country. In this way, the small-holders have been able to live in their own surroundings. The great facilities of travelling, thanks to a dense network of railways and to a system of very cheap workmen's tickets, have, of course, largely contributed thereto. Thus, it is not at all exceptional to find people who live 10, 20 or even 30 miles away from their work.

I think it should be stressed that the small-holdings in Belgium are not so much the outcome of a pre-arranged plan or Government policy, as the fruit of the thriftiness of its rural population. It has not been found necessary to introduce a policy of land settlement on anything like the same scale as has been done in countries with a far less highly developed industry. True, the setting up of small-holdings was much encouraged during a few years preceding the war, and, in 1935, a National Society for Small-holdings (Société Nationale de la Petite Propriété Terrienne) was founded under the patronage of the Government, in order to help small farmers and workers to become owners of their holdings. Loans covering a large proportion of the value are granted at a very low rate of interest. They are redeemable in 10 to 25 years in yearly payments which may not exceed a normal rent.

The holdings taken with the aid of the National Society for Small-holdings do not exceed half an acre, which allows a family to produce an important proportion of its food, viz. all their vegetables and fruit and part of their requirements in potatoes. Nearly all the small-holders keep a pig, a goat, a sheep, sometimes even a cow and nearly always a few chickens and rabbits. Practically the whole of our exports of rabbits (and we used to send yearly to this country 800 tons representing about £60,000) came from our small-holdings in East and West Flanders.

The existence in Belgium of these numerous industrial small-holders has undoubtedly proved a definite economic and social asset. First, there is the moral benefit derived from the fact of living in one's own surroundings in a healthy country district. Then, the small-holdings have certainly reduced the flight from the land and prevented all industrial workers from becoming slum dwellers ; they have, moreover, mitigated the effects of the economic crisis and of unemployment by providing the industrial small-holder with an additional or alternative source of income.

Can this movement of creating small-holdings go on indefinitely ?

The promoters explain that there is, around the industrial centres, a sufficient acreage of land and pastures available to be converted into small-holdings or allotments. Others strongly oppose the movement and point out, among its disadvantages, undue competition and unwarranted increase in the sale and rental value of the land ; the evil influence on the wages of industrial workers ; rivalry with main agricultural production and its ultimate ill-effects on the agricultural labourer. I have no intention of taking sides in the argument nor of trying to solve the problem here and now. However, it appears to me that as far as Belgium is concerned, a limit has almost been reached beyond which it might become undesirable to increase any further the number of these part-time small-holdings. The reasons are quite simple : firstly, the limited acreage available, and secondly, the minimum or optimum acreage required for economic and rational farming.

I should now like to turn to the real farms, the number of which can be put at about 270,000.

As I have said, Belgium is a country of small farms ; 85 per cent. of the total number are farms of from 2½ to 25 acres and cover 50 per cent. of the total agricultural land ; the next most important group is that of from 25 to 50 acres. Thus, even if we do not take into account the vast number of part-time holdings, but only what can be styled as real farms, the proportion of small farms is very large. We have no more than 2,500 farms of over 125 acres, of which only 464 exceed 250 acres.

During the last thirty to forty years there has been a considerable increase not only in the number of part-time small-holdings but also in farms of under 25 acres, and a corresponding decrease of farms of over that acreage (the reduction in number being proportionately highest in the largest acreage groups).

The fundamental reasons for this splitting up of large farms are the pressure of a dense population and the law and customs with regard to inheritance. Big landowners have, moreover, found advantage in splitting up their estates, faced as they were with economic difficulties.

Land Tenure.—According to the 1930 census, 48 per cent. of the Belgian farmers own their land, the aggregate acreage of which represents 41 per cent. of the total agricultural land. Generally it is the small farms of under 50 acres that are cultivated by owner-occupiers, who represent the majority only in the poorer regions (the Campine and the Ardennes), whereas on the very rich plateau of Herve two-thirds of the farmers are tenant-farmers.

The number of owner-occupiers increased considerably between the last war and 1930, thanks to a short period of prosperity for Belgian farmers, but since then there appears to have been a decline again.

Although tenant-farming is so widespread, it should be pointed out that, except for a few large estates, Belgium has not a ' class ' of large land-

owners. The landowners are often people of moderate means who look upon their land as a mark of class distinction and as a source of revenue (which, anyway, is small) and who can hardly afford to keep their farms in good repair. The distribution of ownership may be good from a social and general economic standpoint, but whether it is always to the benefit of agriculture is an open question.

Crops.—Although Belgian agriculture depends less exclusively on livestock than, say, Denmark or the Netherlands, yet about three-quarters of the total production value is derived from livestock and its products.

According to one of our leading economists, 12 per cent. only of our agricultural land is cropped for direct human consumption. The importance of livestock in Belgian agriculture is shown, moreover, by the extent of our pasture land and temporary grass, which cover more than 2,000,000 acres, or about 40 per cent. of the total acreage of the agricultural land. On the whole, two-thirds of the land is used for animal feeding, which absorbs 50 per cent. of the root crops, one-fifth of the potato crop and two-thirds of the cereals.

Another characteristic of Belgian agriculture is that its main task is to feed the population of the country. Of the total value of our agricultural production 94·6 per cent. is absorbed by the home market, which does not mean that the 5·4 per cent. exported is of no more economic importance than shown by that proportion. On the contrary, it is often the main source of income of the particular producer or district.

Before the war, Belgium was nearly self-supporting in meat, animal fats, milk and butter (home production of cheese being almost negligible). But, extensive as was the production of crops for animal feeding, we were largely dependent on imported feeding stuffs. Crops of potatoes, roots, oats and green fodder practically covered the requirements of both human and animal consumption. But we were entirely dependent on foreign supplies for maize, oil-cakes and oil-seeds, whilst the home production of wheat, barley and rye covered only 30, 17 and 75 per cent. respectively of our needs.

What will be the Position after the War?—From the very beginning of their occupation of the country the German authorities decreed that Belgian agriculture should cover the needs of the population to a larger extent. The immediate remedy was, of course, to curtail consumption. But a programme of cultivation has been laid down which must have very serious consequences both on the public diet and health as well as on the balance of our agricultural economy.

The acreage under wheat is to be increased by as much as 225,000 acres (reverting thus to the situation of a hundred years ago) and 75,000 more acres will have to be planted with potatoes. This will be done partly by reclaiming uncultivated land,[1] but a reduction in the acreage of other crops will, of course, be unavoidable.

The acreage under grass will probably be reduced by 15 per cent. and the cultivation of fodder beet curtailed considerably. This will, of course, very seriously affect the position of our livestock. It would be hazardous to make any predictions, but it seems quite safe to say that if these orders are to be carried out, our cattle will have been reduced by 40 per cent. at least in another year or two, whilst the number of pigs and poultry may have gone down to one-third of its pre-war level.

Is there any need to emphasise the disquieting consequences both from a nutritional and an economic point of view?

Post-war reconstruction of European agriculture should tend to reverse this paradoxical situation, where—for once—economic considerations agree with the demands of nutrition experts. As far as Belgium is concerned, it has generally been admitted that, in view of its particular conditions (dense population and its pressure on a limited land area), Belgian agriculture should concentrate on intensive cultivation (and horticultural specialities giving the highest return) and on transforming crops into finished farm products. That is the basis on which the reconstruction of our agriculture will have to be considered. But any plan of agricultural reconstruction in Europe will depend on the wider issue of the general economic policy among nations and the future possibilities of international trade.

[1] A plan to reclaim 250,000 acres of uncultivated land between Brussels and Vilvoorde and near St. Ghislain and Jemappes has been reported.

ECONOMIC AND KINDRED PROBLEMS

FRIDAY, MARCH 20: AFTERNOON SESSION

Mr. F. L. McDougall, C.M.G., Chairman

Nutrition and European Agriculture

INTERNATIONAL action to relate the problems of health to those of agriculture arose as a result of the disastrous failure of the London Monetary and Economic Conference. There the representatives of sixty nations met to disagree about everything except the desirability of the restriction of the production in a poverty-stricken world.

This ironic situation showed that some compelling motive for economic co-operation must be set before the nations, and it was felt that this might be found if human welfare could be made the conscious objective of economic policy.

In 1935 the Australian and New Zealand delegations to the International Labour Conference, and the Australian Delegation to the 1935 Assembly of the League of Nations, raised the issue of nutrition in relationship to health, agriculture and economic questions.

This initiative proved fruitful and, had it not been for the rapid worsening of political relationships, might have led to increased prosperity in agriculture, a marked increase of world trade in

agricultural products, and thus to general betterment.

Since 1935 a great deal of work on the subject of nutrition has been carried out, both internationally and nationally. Both the League and I.L.O. published important reports, optimum standards for nutrition were established for countries of western civilisation, and some 25 countries accepted the recommendation of the League Mixed Committee on Nutrition and established National Nutrition Committees.

Since over 60 per cent. of the world's population are engaged in agriculture, the welfare of the peasant is the greatest of social problems.

In 1938 a Rural Life Conference of Far Eastern Countries was held at Bandenong under the auspices of the Health Organisation of the League.

The League Assembly of 1938 made arrangements for a European Rural Life Conference on a wider basis to be held, it was hoped, in 1939. A Preparatory Committee was set up, the Health and Economic Organisation of the League and the appropriate sections of the International Labour Office and the International Institute of Agriculture commenced work on the documentation for the conference. Unfortunately this work was started too late and the nations were forced by the growing menace of aggression to turn from questions of welfare to preparations of defence.

We have now to take up these problems again in preparation for the reconstruction that will follow when the United Nations have broken the power of aggression and, as the Atlantic Charter says, have secured the disarmament of aggressors or potential aggressors. In re-approaching this problem in 1942, we can look forward with confidence to it being possible, once the war is over, to make far more rapid progress than could have been anticipated in 1938.

The nations are realising that welfare, like peace, is indivisible. The United Nations have, in the Atlantic Charter, accepted the lead given by President Roosevelt, whose message to Congress in January 1941 provides the basis for our future action, namely the Four Freedoms 'attainable,' as the President said, 'in our time and generation.'

If this practicable ideal is to be secured, however, it is of the utmost importance that we should have plans ready for immediate action as soon as victory enables them to be put into effect. The two or three years following the conclusion of the war will be vital.

If vigorous action is then taken along lines discussed and agreed between the United Nations before the war comes to an end, we should be able to secure results of the utmost importance before dull complacency or the opposition of special interests can frustrate our endeavours.

Freedom from Want.—Can there be a better starting point than freedom from both conscious and hidden hunger?

Dr. Parran, the Surgeon-General of the U.S.A., has said: 'Like an iceberg, nine-tenths of our malnutrition, and the most dangerous part, is under the surface.'

There has always been much hidden hunger in Peasant Europe, and not a little conscious hunger.

Comparison of peasant diets, however, present formidable difficulties owing to the lack of adequate statistics.

Let us for once start from the other end and consider what can be deduced from vital statistics.

If the crude death-rates, the infantile mortality, and the deaths from tuberculosis of Continental Europe are compared, the countries fall into three groups with low, medium and high records.

At the top of the scale are the advanced smaller democracies, Holland, Norway, Denmark, Sweden and Switzerland—Holland having the honour of sharing with New Zealand and Australia the best health record in the world. At the bottom of the scale are the countries of Central and South-eastern Europe, together with Spain and Portugal.

The two European extremes are Holland and Rumania, the former with a crude death-rate of between 8 and 9 per 1,000 and an infantile mortality of between 35 and 45 per 1,000, and the latter with a death-rate of between 18·5 and 21 and an infantile mortality from 175 to 185. These enormous differences reflect a completely different standard of well-being. The contrast can be accounted for by differences in sanitation, education and nutrition, and the nutritional factor is of high significance.

Holland enjoyed a good mixed diet, while the food of the Rumanian peasant has been described as maize plus flavourings. Throughout Eastern and South-eastern Europe and in the Iberian Peninsula poverty imposes standards of living and of nutrition which result in the ravages of tuberculosis being far more serious than among the industrial proletariat of Western Europe.

At the British Association's Conference on Science and World Order an International Committee was proposed to work out a world-wide food policy based on human needs. The starting point must be to ascertain the real facts and to correlate them with conditions of health in the various countries. Such work is important both for immediate post-war relief and for reconstruction.

The pre-war food situation in European agriculture varied greatly from country to country. In certain infertile areas where population pressure was intense, an absolute shortage of food was the annual experience. These agricultural depressed areas constitute a special problem.

Throughout the rest of Europe it can be assumed that the farmer, farm worker, or peasant obtained a full supply of calories, for without these they could not carry out their relatively strenuous work.

The major differences arose in the extent to which the diets provided high quality proteins, mineral requirements and vitamins. In the mixed farming areas of North-west Europe, where animal husbandry plays a large part, agricultural diets include substantial quantities of milk, cheese, some meat, potatoes, and green vegetables. These foods, together with bread, provide a good mixed diet.

Where farming is mainly based on cereal production, energy requirements may have been fully met, but there is frequently a serious shortage of high-grade proteins, calcium and some of the vitamins.

Where, as in Rumania, maize constitutes the principal cereal consumed, definite deficiency

diseases made their appearance and pellagra was a serious factor.

The deplorable vital statistics of Spain and Portugal suggest that a diet of bread, olives, onions and wine is no substitute for the mixed diet of North-west Europe, and it is probable that throughout the greater part of Europe there was great need for the increased production of milk and milk products, and for green vegetables in order to bring peasant diets up to a reasonable standard for health.

During the war it is probable that European agriculture is faring a great deal better than the urban populations. The rationing systems allow special allocations for self-suppliers, and it is well known that under war conditions the authorities always experience great difficulty in preventing peasants from hoarding food or from feeding cereals to pigs or poultry in order to secure profits from the black market.

Danish farmers are probably better fed to-day than in peace, since they have substituted their own butter for imported margarine. On the other hand the Greek or Polish peasant is probably suffering severely, although not so severely as town dwellers.

In the post-war reconstruction of European agriculture, if we are to give real meaning to freedom from want, steps must be taken throughout most of Europe to increase animal husbandry, and to secure a far greater output of vegetables. This is necessary both for the welfare of the peasants themselves and for the townfolk.

The most urgent problem may well be in Eastern and South-eastern Europe. Hungary in 1937 established a vigorous National Nutrition Committee. This committee reported that the monoculture of wheat in certain districts led to the most serious nutritional deficiencies.

Rumania, Poland, Yugoslavia, Bulgaria and Hungary are all predominantly agricultural countries. They are all net exporters of foodstuffs and they all suffer from malnutrition.

The remedy for this state of affairs may be found in three papers delivered at the Conference held by the British Association in September, 1941, on Science and World Order, namely the papers by Sir John Orr, Professor Gulick and Professor Hansen.[1]

Sir John Orr suggested that the basic purpose of any national agriculture must be to provide as large a contribution as possible towards the nutritional needs of its own country.

Professor Gulick, without making any special reference to nutrition, gave a vivid picture of the way in which the United States Government has, through the Tennessee Valley Authority, converted a depressed agricultural area into a national asset.

Professor Hansen suggested an International Authority to finance the necessary changes.

The application of the principle underlying Sir John Orr's paper to the problems of peasant Europe would require a reorientation of production to ensure that an adequate mixed diet was available both to the peasants and to the urban populations.

This would mean that the areas devoted to wheat and maize, and in some countries perhaps to sugar beet, should be reduced, and that there should be an increase of dairying, pig and poultry keeping, and in the production of vegetables and fruit.

The export of cereals, however, provided one of the principal methods whereby European countries dependent on agriculture paid for their imports.

In the better world which we are determined to create, it will still be necessary for the nations to achieve some balance of payments, and while we may hope that South-eastern Europe may be able to develop an export trade in the special wines, liquors and processed fruits which the Western traveller so much enjoyed when he visited these countries, yet they are likely to remain dependent on a substantial export of cereals.

The solution of this problem may be found in two directions. The average yields per acre in Eastern Europe compare very unfavourably with the West, and the price obtained for, say, Rumanian wheat, owing to defects in quality and grading, is unduly low. The development of agricultural education and co-operation along the lines so successfully practised in Denmark might go far to provide a remedy.

These considerations lead us to Professor Gulick's paper about the Tennessee Valley Authority and to the slogan ' a T.V.A. for the Danubian Valley.' Professor Gulick described how, in an area about the size of England, haphazard settlement and deforestation had led to floods, soil erosion, and to a poverty-stricken community. The setting-up of a central authority for dealing with riparian problems, the production of electrical power, the promotion of local industries together with an intensive drive for agricultural co-operation and social and agricultural education, are already having an extraordinarily beneficial effect.

The application of this idea in the Danube Valley seems to have much to commend it. It presupposes a Regional Authority with clearly defined powers derived from the various central political authorities in whose territory it operates.

In South-eastern Europe such a Regional Authority might be responsible for the control of the rivers, irrigation, improvement of transport, the stimulation of appropriate industries, and for the development of regional bodies for agricultural education and co-operation, in order to bring about a progressive improvement in standards of living without making any violent break with the general peasant traditions of the countries concerned.

It would, however, only be possible for the countries of South-eastern Europe to carry out the sort of programme indicated at a very slow rate unless they could be assisted by some external agency. Here the paper given at the Science and World Order Conference by Professor Hansen may perhaps indicate future possibilities. He then suggested something of the nature of an International Finance Corporation which might either itself make loans for specific purposes to governments or to appropriate regional authorities or, alternatively, underwrite loans made for approved purposes.

It should not be impossible for the wealthier countries of the world to find means of placing at

[1] Published in *The Advancement of Science*, vol. ii, no. 5.

the disposal of the less well-to-do countries the means for the re-equipment of agriculture, for the improvement of transport, for the establishment of appropriate industries and for the provision of technical advice. Indeed it may well prove essential to the older industrial countries to take the lead along some such lines if they are to secure in the post-war world adequate outlets for their own energies and for the full employment of their own peoples.

In any such programme adequate nutrition should be regarded as the first essential ; first, not only because of the direct effect of proper food upon health, but also because the attainment of diets adequate for health is well within the powers of achievement of all the countries in Europe, and it is not a bad thing to make the first item in an international campaign against poverty an objective which can be both measured and realised.

Dr. D. Mitrany
Large Scale and Peasant Farming in Eastern Europe

In the Communist Manifesto the new socialist current had already demanded the nationalisation of the land and its cultivation in large units upon a 'common plan,' by means of 'armies of labourers.' To Marx and Engels this was not so much a political programme as a historical decree. Concentration in ownership and production was proceeding irresistibly in industry ; and viewing that accumulating tide from the vantage point of the Reading Room of the British Museum, Marx never doubted that what was true for industry was bound to be true for agriculture too. Nor were the Socialists distressed by this. The old peasant subsistence economy was, in their view, of no use for the modern industrialised state. With this view the classical economist concurred fully. The economists of course stood for private ownership and for private profit ; but for the rest they wholeheartedly agreed with the Marxians in looking upon the extinction of peasant agriculture as something if not immediately possible, at any rate inevitable and perfectly desirable.

That likeness in outlook between Marxist and classical economists still holds good of our time. It was part, then as now, of the same climate of opinion. Large units of operation were taken without questioning to mean greater and better production, and production was the glittering goal upon which all their eyes were riveted. The issue of large *v.* small in agriculture is a complex one, largely technical, and I am not here to debate its theoretical points. My part is to inquire briefly as to how it applies to the peasant countries of Eastern Europe. The general views of western economists on the working and problems of eastern agriculture, and on the substantial land reforms carried through in those parts between the two world wars, have been guided by the same dogmatic subjection to the fetish of large-scale production ; in being so guided they have gone hopelessly astray. Their judgment of peasant agriculture has rested on a historical inconsistency, on an economic fallacy, and on a social delinquency.

(i) The historical inconsistency was to assume dogmatically that the demand for wheat during the rise of the new industrial centres must be the determining criterion for judging agricultural organisation and production—cereal growing being a speciality of large farms. Subsequent developments showed that the demand for wheat is inelastic ; moreover, and especially, that it could be amply satisfied from the great wheatlands overseas, the opening up of which has affected this type of European agriculture disastrously.

(ii) The economic fallacy was to assume that large-scale production was an infallible criterion of efficiency. Since the depression this has come to be questioned even for industry. In agriculture it has always been uncertain, bound by many technical limitations. And in relation to the peasant countries of Eastern Europe it was definitely false. Large-scale production means in effect not only big in extent but also deep in intensity ; in other words, it is a three-dimensional measure. In the peasant lands it was, and still is, two-dimensional ; the large estates were cultivated in the same way as the peasant holdings, and indeed mostly by the peasants with their own animals and implements and seed. (That explains in fact the concentration on cereals, as other crops would have required more means and knowledge and care.) Moreover, large-scale agriculture in those countries, with few exceptions, could maintain itself only as long as it could command semi-servile conditions—in regard to labour, to economic favours and to administrative privileges.

(iii) Finally, the quantities which through such abusive conditions were made available for export were never true surpluses. Exports from old Russia as from Rumania have always been starvation exports, obtained by depressing through fiscal and other means the standard of living of the peasantry to the point of severe and chronic under-nourishment.

Be that as it may, certain fundamental changes in conditions and outlook have utterly upset those premises, erroneous as they were, upon which the Marxian and the classical economists based their agrarian judgment.

(i) From the purely economic standpoint the opening-up of the rich overseas wheatlands have made it impossible for European agriculture to compete on terms of equality in the wheat market.

(ii) But since the depression the general outlook has shifted greatly. The general concern is not so much with production, which we now can increase almost without limit, but with distribution—not with trade and profit, that is, but with social security. This gives us the true meaning of peasant farming—for the peasant. To him it is the equivalent of the many life-lines which in the West the State has had to throw to the derelict industrial workers, and an equivalent which in his view rests on better material and moral foundations.

(iii) Moreover, the same change in outlook has caused the agricultural problem itself to be considered first of all from the social angle. Especially in the last year, under the farsighted and generous guidance of President Roosevelt and Vice-President Wallace, the problem of agricultural reorganisation is being studied from the standpoint of nutrition. This has brought out the fact that even in the United States, not to speak of the countries of

Eastern Europe, there is everywhere a serious shortage of 'protective' foods. Recent calculations for Rumania, for instance, have shown that its agricultural production would have to be increased all round (with the one exception of maize) by anything from 100 to 400 per cent. to provide even the minimum requisite diet for its population, without anything being left over for export. It is an undoubted fact, to which even Soviet policy has had to adjust itself, that small-scale cultivation, assisted by co-operative arrangements, is much more effective for the production of high-quality products than extensive large-scale farming; so that even from the economic standpoint the peasants stand to come into their own again.

(iv) There is one final aspect of this issue which reaches into the political field, with an important bearing on the war and reconstruction. The alternative in Eastern Europe to a peasant agriculture, intended to satisfy above all the nutritional needs of the population concerned, is an agriculture directed towards mechanised farming and concentrating on certain staple products for export. That is the idea that inspires the Nazi 'New Order' for Europe. It wants to achieve a European self-sufficiency 'which is to make the Continent immune against the threat of blockade for ever.' The two ideas are therefore to make Europe self-sufficient, with the gradual exclusion of overseas wheat from the European market, and to do so in the interest not of the Continent's nutritional needs but of its military strength. In the light of such intentions the present discussion acquires an importance vastly beyond its local limits. For the converse of the Nazi ideas means that in the measure in which Eastern Europe, especially, is organised on a peasant basis, the agricultural war potential of the Continent would be kept in check. And it also means that co-operation with the overseas grain countries, on the basis of a more rational division of labour in agriculture, in the light of the new demand for a greatly increased supply of protective foods, could only be reached through the development of mixed peasant farming in Europe.

Dr. N. Barou, Ph.D. (Econ.)

Collective Farming in the U.S.S.R.

LENIN said in 1919: 'If we could give to-morrow 100,000 first-class tractors, supply them with oil and mechanics (and you know well that at present it is only a fantasy), the average peasant would say: "I am all for a commune (for communism)."'

Lenin's dream of 1919 has become very much of a reality. As a matter of fact his figure represents less than 20 per cent. of the tractor equipment of the U.S.S.R. in 1940.

Rural co-operation has tackled nearly every side of agriculture, but except in the U.S.S.R. and Palestine it has left to individual effort the problem of organisation of agricultural work. This problem is solved by the Collective Farms.

In accordance with the laws of the U.S.S.R. the land occupied by collective farms is the property of the State, but the farms hold it 'in perpetuity.' Nearly a quarter of a million farms with about 20 million family members received special 'deed papers' confirming their rights to hold their land (with exact boundaries indicated) 'forever.' Over 40 million individual members work on the farms. The method of member's remuneration has changed considerably, but according to the legislation of 1940 it is made dependent on his personal contribution, as a worker, to the achievements of the farm. Members work in brigades, each brigade has to fulfil a planned piece of work. For this work they are paid in accordance with the number of work-days spent. The work-day unit is the equivalent of the average amount of work that can be performed by a collective farmer in one working day, as fixed by the standard quota set for each type of work. If the brigade produces more than is planned it gets $\frac{1}{4}$ of the surplus in grain, $\frac{1}{3}$ in flax, $\frac{1}{5}$ in potatoes, $\frac{1}{2}$ in sugar beet, 15 per cent. in eggs and milk, etc. The surpluses are paid in money and not in kind, and distributed inside the brigade in proportion to work-days; special skill and efficiency are graded up in work-days. Each family in a collective farm receives a plot of land for gardening, growing of fruit, vegetables and potatoes. They are allowed also to keep a number of cattle, pigs, sheep and poultry. It has not been easy to strike a balance between the members' interests in regard to the collective farms and in regard to their own homestead work. As late as in 1937 one-fifth of all members worked below fifty work-days a year, and concentrated their energies on their homestead plots, which often grew much above the permitted size. In 1939 the State transferred to communal use nearly 5 million acres of such land. A minimum of 150 work-days during a year has been introduced in 1942.

The area of sown land of the collective farms amounted in 1939 to 295 million acres. The agriculture of the U.S.S.R. is highly mechanised. The farms have over 150,000 threshing machines, lorries, motor cars, 708,000 sowing machines, etc. But their success is mainly due to technical assistance given by the State Machine Tractor Stations, numbering 6,647 with over 400,000 tractors and 130,000 harvester combines. The Stations are remunerated by a share in the crop.

Mechanisation has increased productivity of labour in the collective farms, and it is twice as great as it was in individual farms twelve years ago (1925–1937). It has also considerably improved the quality of cultivation. The average yield is still low: it was 9·3 centners per hectare in 1938, but it was planned to increase it to 13 centners in 1942, and this average has been within reach before the outbreak of the war. Total grain production amounted to 121 million tons in 1940, as against 72 million tons in 1913; 3 million tons of fertilisers are now used—nearly 15 times as much as in 1913.

Livestock, which suffered badly (losing nearly 50 per cent.) during the transition period (1929–1933) from individual to collective farming, has shown improvement during the last years.

The amount of produce from tillage and stock-breeding to be delivered to the State is now calculated on the basis of the number of hectares of land in each collective farm, thus increasing the initiative of collective farmers in developing stock-breeding.

The collective farms have over 2,000,000 responsible officials and millions of tractor drivers, combine engineers, lorry and motor drivers, mechanics, etc. The women play a great part, nearly 40 per cent. of total work-days being accounted for by women workers as long ago as 1937.

The membership has benefited to a considerable extent from the technical progress of collective farming. The income of a member-family has grown in grain from 0·6 ton (in 1932) to 1·7 ton (in 1937) or nearly threefold. The monetary income has also increased more than threefold.

The combination of collective farming with an outlet for individual energy and effort of the members in their own homestead production has helped to bridge over the first most difficult years. It has enabled the members to maintain their existence at a time when collective production was unable to satisfy all their requirements.

Collective farming presents a new realistic approach to agricultural economy of national dimensions. It should serve as a great practical school for reformers of rural life, who are anxious to rebuild it on the foundations of organised progressive economy.

Dr. Rudolf Bićanić
Excess Population

I. Agricultural Over-population in Eastern Europe

Although Eastern Europe from the Baltic to the Adriatic and Black Sea is not very densely populated, there is an agricultural over-population in this region. That is to say, a greater number of people live on one unit of the cultivated surface than are required to work it or than can possibly attain a decent standard of living from it. This phenomenon has grown to such an extent in Poland, Rumania, Yugoslavia, Greece, in the eastern parts of Czechoslovakia (Slovakia) and in the mountainous parts of Austria, that it now represents one of the gravest social and economic problems of this region.

Taking into account that, according to accepted standards, a decent living in peasant Eastern Europe roughly requires 1·25 hectares of cultivated land per head, we can assume that, in the year 1931, agricultural over-population reached the figure of 14 millions for all these countries together. This figure would have increased to 17½ million people by 1938. According to J. Poniatowsky, at least one-third of the agricultural population of Poland could be withdrawn from agriculture without reducing production. Egoroff for Bulgaria and Bićanić for the Croatian part of Yugoslavia have concluded that, on an average, one-third of the agricultural population represents a surplus which is in fact a burden for the stage of development already attained by agriculture and prevents its further advance.

This over-population is caused by a greater increase of population than extension of cultivated land, increase of intensive agricultural production and development of other branches of economy. Since agriculture has reached a high degree of saturation of man-power, the increase of population directly increases the surplus population.

II. Effects of Agricultural Over-population

The fact that too many people live on too small an area of land has far-reaching direct and indirect consequences.

(1) The standard of living is low because 100 ha. of cultivated land has to support 90–150 peasants in Eastern Europe, whereas it does not provide a living on an average for more than 16 in the U.S.A., and 20 in the Argentine.

(2) The purchasing power of the peasants is small, because the major part (50–75 per cent.) of the peasant's agricultural production is for domestic consumption. In Yugoslavia, only one-third of the wheat and maize harvest is sent to the market, although these are the two biggest cash crops.

(3) The exploitation of the peasants is greater because it is their first necessities that they must meet from their small amount of cash (marginal utility). They are bound to accept the market price that they are offered, and also to pay the market price that they are asked for their purchases.

(4) The improvement of agriculture is hampered by the fact that too many domestic consumers impede the accumulation of capital necessary for productive investments.

(5) The animal population per ha. is one-half to one-third of that of Western Europe, because the cultivated area has to produce food for the dense human population.

(6) Labour is not economically employed. It is estimated that in the greater part of the area one-third of the working time is used unproductively, although production under existing conditions takes about twice as much labour as in Western Europe.

Machines cannot be introduced to a satisfactory extent for the same reason, human labour being cheaper than the buying, amortisation and running of machines. Even the tractors and machines which had already been introduced were given up after the great crisis, first because labour was cheaper, and later, in several States, by order of the authorities, so as to give employment to the poor agricultural population.

(7) The great rural over-population represents in fact a ' hidden unemployment ' which becomes manifest in a great pressure of the rural population on the labour market in towns and industries. This pressure keeps the wages low and is one of the reasons for the small purchasing power of the working class in Eastern Europe.

(8) The fact that too many people (80 per cent. of the population) have no other occupation than agriculture has the consequence that an interior market which could absorb the agricultural surplus production at fair prices cannot be built up.

(9) The continual dividing-up of peasant holdings is due to the same pressure of increasing over-population. This leads to a lineal pauperisation increasing from generation to generation. Holdings of less than 20 ha. (50 acres) comprise 50–80 per cent. of the total. This is the worst effect of agricultural over-population.

(10) In some parts, the pressure of over-popu-

lation provokes a sudden and drastic decrease of the birth-rate in the villages, due mainly to the prevalence of abortion by the most harmful methods, which also leads to a very high death rate among women in their prime of life.

(11) The phenomenon of agricultural over-population has its international implications also.

(*a*) The quantity available for export is very small. (The export of main crops comprises 10–20 per cent. of the total production.)

(*b*) Even these small exported quantities represent a hunger export, due to the pressure of the peasant's cash necessities.

(*c*) The fact that, compared to the New World, 7–10 times as many people have to live and produce on the same area in Eastern Europe prevents the possibility of successful competition with the New World even by the use of tractors or any other kind of agricultural machinery.

(*d*) The small purchasing power of the peasants, due largely to the fact of agricultural over-population, makes these countries poor markets for foreign trade. Their pre-war import per head was 6–9 dollars (compared with 96 dollars per head in Belgium or 99 dollars per head in the U.K.).

War and the Agricultural Over-population

The question arises what effect the war will have on over-population. There are two opposite tendencies.

(1) A decrease will occur owing to—

(*a*) A greater mortality caused by the war and the consequent distress. Connected with this there will be a decrease in the birth-rate during war time. We have at present no means of estimating what this will amount to, but it is easy to get the impression that it will be greater than will actually be the case, especially in the villages.

(*b*) A greater rural exodus during and after the war for different reasons. Many soldiers will have severed their connections with the village. Prisoners of war from villages will have become accustomed to factory work. But, above all, youth will be attracted to the towns for psychological reasons in the post-war period of emotional instability.

These factors will tend to reduce agricultural over-population, but, at the same time, they will open equally difficult problems in the towns.

(2) A tendency to increase of over-population will be felt in the following ways :

(*a*) Agricultural over-population being a relative conception, the decrease of agricultural production (which, during the war, is occurring up to 50 per cent. of the normal production in several countries) will necessitate more land to give subsistence to an equal number of people.

(*b*) Higher prices for agricultural produce will provoke a stronger social differentiation and force a greater number of peasants who partially buy their food (and there are some 20 millions of them in Eastern Europe) to sell their land in order to face this necessity.

(*c*) Lack of confidence in money and the difficulties of nutrition provoke the buying of land by non-agricultural, wealthier people, and consequently the area available for people who live exclusively from the land will decrease.

It would seem that the tendency to increase of over-population will be stronger than the opposite tendency, even though there will be an actual decrease in population.

In any case, in the post-war period of greater social mobility and psychological unrest, the pressure of agricultural over-population will find a more acute expression in the demands of the peasants.

III. Possible Solutions

The agricultural over-population problem in Eastern Europe is a vicious circle. Too many people on too little land cannot develop sufficient purchasing power either to make new investments for the increase of agricultural production or to buy consumption goods which could develop an industry giving employment to a greater number of surplus population. This vicious circle must be broken.

The problem is, in fact, how to create new means of existence for 17½ million peasants in Eastern Europe. There are many possible solutions which can be looked for both inside and outside of agriculture. They consist in changing the factors of agricultural over-population :

(1) by giving more land to the people who live by agriculture ;
(2) by increasing agricultural production per hectare ;
(3) by reducing the numbers of the agricultural population.

(1) *More Land*

A. *New Cultivated Land.*—The possibilities of bringing new land under cultivation should not be under-estimated, although they are not extensive. The estimated 16 million hectares of so-called unproductive land in the whole area comprises many hundred thousand hectares which could be rendered productive : marshes, flooded land which needs to be drained, sandy ground which has to be fixed, millions of hectares of mountain area to be afforested. (In Greece and Yugoslavia there are 8 million hectares of such land, many of them made unproductive by erosion.) The cultivated land has been increased during the last ten years by 530,000 ha. in Yugoslavia and by 880,000 ha. in Rumania. But this increase could only give subsistence to 1·1 million out of an increase of 6·7 million people and could but solve the problem to a small extent. The 26 million hectares of forests cover great stretches of land which could be used in a more productive way. The same applies to the pastures.

B. *Agrarian Reform.*—The agrarian reforms after 1918 did not solve the problem although millions of hectares were given to the peasants. There is still land which could be distributed among those who work on it. Altogether there are roughly about 10 million hectares in holdings over 50 hectares. Certainly there is not any greater proportion in Bulgaria, Yugoslavia and Greece, and it could not therefore provide land for more than one-tenth of the over-population. In Rumania, Poland and Czechoslovakia about 18 per cent. of the land is in the hands of larger holders (over 50 hectares). In Hungary this is the most urgent social and

political problem. But where there is no land to be divided the idea is gaining ground among the peasants of changing the juridical régime of land ownership. These ideas are tending towards limiting the acquisition of land to those who work and live exclusively on and by the land.

C. *Consolidation of Holdings.*—Redistribution of the land, and the grouping together of the dismembered parcels has, in some areas of Croatia, increased the productivity of the holdings by 20 per cent.

D. *Internal Colonisation.*—The fact that, in the most fertile parts, there is the smallest density of agricultural population (50–100 in the plains) and that in the less fertile parts of the area the population per cultivated land is the most dense (300–400 in the mountains), must cause a spontaneous tendency to migration from the more densely to the more sparsely populated areas, i.e. from the mountains to the plains. This tendency is supported by the fact that the price of land is determined more by the shortage of land (i.e. density of population) than by the rent. By selling one hectare of land in the Croatian Highlands, the peasants can buy 2–4 hectares in the Pannonian plain.

(2) *Intensification of Agricultural Production*

A. Agricultural over-population is a relative conception. More people can live on the same space if there is greater production. Taking into account the great over-population, increase of production is at the first step less a problem of the introduction of machinery than of using the surplus man power. That means that crops must be introduced which demand more human labour. And these are just those crops of vegetables and fodder which can increase and improve the quality of the people's diet, by reducing the areas under cereals and by increasing livestock, dairy and poultry production, as well as fruit and industrial plants. The problem of intensification of agricultural production and improvement of diet must go hand in hand with the settlement of the problem of over-population. It was by the intensification of agriculture that Western and Central European agricultures settled their problems during the great European agricultural crisis, 1873–1895. There is the same tendency now in the agriculture of Eastern Europe to increase the area under vegetables and fodder. There are 8 million hectares under these crops out of 57 million hectares of arable land. But if we want to settle the problem by these means (aiming at an average of 33 per cent. of arable land under such crops, corresponding to conditions in Western Europe) we must increase this area by 50 per cent. in Poland and Hungary, and by 300 per cent. in Rumania, Yugoslavia, Bulgaria and Greece. These areas have already increased during the last 10 years to a considerable extent; for instance, by 25 per cent. in Yugoslavia. But it would take a hundred years to reach the above-mentioned aim at the present rate.

The intensification of agriculture through the introduction of more machinery could be carried through in the second stage, when the problem of surplus population has been largely solved. On the other hand, it must not be forgotten that the yield per hectare of cereals is greater in Eastern Europe than in the mechanised agriculture of America and the U.S.S.R.

B. *Collectivisation.*—From the point of view of agricultural over-population, collectivisation takes on a special aspect. The predominant consideration cannot be the increase of production for the market and the reduction of the number of agriculturists through machinery, but the possibility of giving a better livelihood from the land to a greater number of people living on this land. This is why new forms of collective agricultural collaboration are arising in Eastern Europe, of which the Co-operatives are not the only instances. Rural communes have tended to become not only administrative but also economic units. Better and modernised exploitation of the village common land and forests has recently begun and new types of peasant organisations have appeared. The State's economic intervention during and after the great crisis has developed new forms of collaboration among the peasants.

(3) *Reduction of the Agricultural Population*

The third line of solution is the reduction of the number of people living from agriculture.

(1) *Emigration.*—The life of the peasants in over-populated countries is becoming so hard that, if the frontiers of other countries had been opened, millions of peasants would have gone out into the unknown simply to find some way of deliverance from their intolerable conditions. But this could only be accepted as a solution if no others could be found. The closing of frontiers for emigration after the last war has, to a large extent, counterbalanced the effects of the agrarian reform in Eastern Europe.

The actual emigration from Eastern Europe in 1937 amounted to less than 150,000 emigrees to continental and oversea countries (including permanent and temporary settlement). It would need eight times as great an emigration to absorb the yearly increase, without even affecting the present state of over-population. To settle this problem entirely by emigration within ten years would demand an additional number of at least 2 million emigrees yearly.

Emigration does not represent a commendable solution for three reasons.

(*a*) *Politically* it is a question of small nations fighting for their existence against greater neighbours. The opening of the frontiers would weaken them numerically and create new dangers. Remember the case of Poles and Croats who, before the World War, emigrated from their homelands, which were settled by Germans and Hungarians practising a more intensive agriculture and politically stimulated by their governments. The recent pre-war experiences show that this danger is not to be under-estimated. (*b*) *Demographically* emigration draws away the best people in the best years of their life. (*c*) *Economically* emigration means a net loss of productive man-power. These countries have great possibilities of development if tackled in the right way. To cite only one fact as an instance of existing possibilities, there is water-power amounting to 7 million horse-power, of which less than 450,000 h.p. have been used.

Meanwhile, the mere historical comparison

of the general density of population shows the direction in which the solutions ought to be sought. The number of people who can exist at present on a square kilometre is equal to the density which prevailed in England after the Napoleonic wars, in France during the régime of Louis Philippe (before 1848), and in Germany in 1870. These comparisons show clearly what stage of economic evolution the Eastern European countries have reached.

(2) *Urbanisation.*—The building of great cities in these countries offers certain possibilities. At present, 77–86 per cent. of the population live in communes of less than 10,000 inhabitants, and only 3–10 per cent. in communes greater than 100,000. Although urban development has been proportionally very rapid, it has not been able to absorb the surplus population. One wonders whether it is advisable to force the pace of this increase at a time when Western European countries are encouraging de-urbanisation for hygienic, social and strategical reasons. Would it not be better to go straight ahead and develop our countries according to the tendency of the twentieth century rather than to follow the opposite tendency of the nineteenth century first?

(3) *Industrialisation.* — Industrialisation holds further possibilities of absorbing the surplus labour from agriculture, without emigration to towns. Industrial population is 10 per cent. of the total, and 5 per cent. only are occupied in commerce and transport. (These figures are twice as high in Hungary, four times as high in Czechoslovakia, and five times as high in England.) The number of workers amounts to 4½ million, as compared to 63 million peasants (or 41½ million of active agricultural population). If we want to absorb the agricultural surplus population into industry, we must employ 8¾ millions of people. Taking into account that the increase of industry also causes an increase in commerce and transport of about a third to a half of the numbers employed in industry, the absorption of over-population by industry would mean an increase of 6½ million industrial workers and 2¼ millions in commerce and transport.

This means that the number of industrial workers in Poland, Yugoslavia, Rumania and Bulgaria should be trebled, and that in Greece it should at least be doubled. This is a huge task requiring great capital and technical equipment.

The advantages of industrialisation from the point of view of agricultural over-population are the following:

(*a*) It frees agriculture from a surplus of consumers and more than proportionally increases its purchasing power.

(*b*) It creates an additional internal market for agricultural produce more than proportionally.

(*c*) It develops the wealth and the productive power of the country. Industry gives greater advantages than emigration, providing the double solution of employment and market, and, in addition, it develops the country. The capital necessary for emigration would give much greater results if invested inside these countries.

Industrialisation involves the problem of markets, which limit its extension to a certain degree at every stage of development of agriculture. Given pre-war conditions of prices, capital, and technical advance, the output per head of one industrial worker in Yugoslavia is roughly equal to the output for the market of fifteen peasants. And the consumption power of an industrial worker with regard to agricultural goods is equal to the production of three agriculturists for the market. This means that every peasant employed in industry has an industrial output five times greater than his purchasing power with regard to agricultural goods. The consequence is that industrialisation creates the necessity for export at a greater rate than it develops the internal market for agricultural produce. As it is not possible for a new industrial country to-day to compete in export, industrialisation would soon reach its limit.

Since we consider industrialisation an important means of settling the problem of over-population, the issue is to be found in a change of the methods of industrialisation. The present methods of industrial protection stiffened into rigid cartels, and based on high prices and small real production, have not produced favourable results with regard to the increase of the internal market. It is sufficient to see the indices of agricultural and industrial prices (base 1913—100) in order to grasp this fact. These indices show that in Yugoslavia, for instance, the industrial produce had an index of 1,450, while the main cash crops show an index of 680.

Better results were expected from an industry based on a policy strengthening the purchasing power of the peasants; on the organisation of an internal market rather than on the stimulation of the hunger- and dumping-export, on planned and directed investments in order to create new industries which would employ relatively more labour; and on a production which would satisfy the wants of the greatest number of people in a planned economy.

From the point of view of over-population, it is important to stress that the best solution is to bring industry to the village, a method which is technically possible in our times of electricity and motorisation.

(4) *Home Industry and Complementary Occupations*

Home industry in Eastern Europe is not estimated according to its present importance or its potential possibilities. Take the example of Yugoslavia. Home industry provided the same proportion of the national income as industry in factories or workshops in 1936. The possibilities of a future development and modernisation of home industry are also under-estimated. The organisation of home production for the needs of the family and the village represents one of the most important factors for the improvement of the living standard within the immediate grasp of the peasant. It would have speedy and immediate effects and does not demand much capital investment or any great amount of cash. On the other hand, it would make use of all the man-power lying waste or being unproductively engaged at present. An increase of home industry would not necessarily mean the introduction of a 'sweating system,' particularly if based on co-operative principles and supported by the State. There are great possibilities of using

unemployed labour in this way, which would be extremely useful at least for finding employment for seasonal labour surplus in the over-populated areas, particularly as regards women. It would mean at least a transitory measure until more permanent solutions of this problem could have some effect.

(5) *Public Works.*—Public works must be considered as the first and immediately effective measure to solve the problem of rural over-population, and provide employment for surplus labour. These public works should be distributed among the greatest possible number of people and cover the greatest possible area.

IV. Conclusions.

In our review we have tried to draw attention to the following considerations.

(*a*) Agricultural over-population impedes the development of agriculture and causes a great pressure on the whole economy of Eastern Europe.

(*b*) There are various practicable solutions, the choice and degree of application of which depend on the conditions of each country and of the whole region.

(*c*) New methods should be applied which will give speedier results, because the problem is how to stimulate the development of the productive powers at a greater pace than that at which over-population increases. The actual, old evolution of some percents yearly is too slow. Methods are required which, in a few years, will make changes of several hundred per cent. The natural, technical and organisational possibilities for this exist. But to effect changes in 5 to 10 years which, at the present tempo, would take 50 or 100 years, would cause great dislocation and result in failure with all its consequences, if it were not done according to a well-conceived and co-ordinated method, that is by a planned economy within a sufficiently broad international frame.

Mr. P. Lamartine-Yates

Factors affecting Peasant Prosperity

To analyse the factors which favour prosperous farming we may make a start by looking at one or two outstandingly prosperous agricultural groups and see how their economic circumstances differ from those prevailing through most of Europe. Take first, wheat growing : in this the highest standard of living is among the farmers of the British Dominions and the U.S.A. The incomes of the family farmer and hired worker are three or four times those earned in Europe. Why ? Largely because of cheap land and plenty of it. Two men look after 150 or even 250 hectares, thanks to the tractor and combine harvester. Although output per hectare is not high, output per man is enormous. Thus New-World wheat can be sold at half the European price while the growers enjoy the highest living standard of any farmers in the world. That is how we should all like to grow wheat if we could, provided we took care, as the Americans are now taking care, not to destroy the fertility of the soil. Such methods, however, are quite out of the question for Europe.

Now let us glance at another type of system, this time in dairying : the farmers of Denmark have set an example in technical efficiency and rural prosperity that is the envy of all. What are the characteristics of their system ? First, the most highly cultivated land in Europe ; 83 per cent. of their land under the plough and at the same time highest yields per hectare in most of the important crops. Secondly, a livestock population so large that not even these huge crops suffice as fodder, but hundreds of thousands of tons of extra feeding stuffs have to be imported each year. Thirdly, they are fortunate in having on their land a comparatively small number of workers to grow all the crops and look after all those animals. To each active worker in agriculture there are in Germany 3 ha. of farm land, in the Netherlands 4, but in Denmark 6 ; similarly for each worker there are in Germany 3 livestock units, in the Netherlands 5, but in Denmark 8½. From this it is not surprising that before the war the net output per worker in Danish agriculture was £150 per annum, in Germany only £70, and in Eastern European countries a great deal less.

It is net output per man more than any other single factor that determines the farmers' standard of living. How do the Danes do it ? First they are lucky in having not too dense a population. It is obvious that from a given area of land 20 workers cannot earn so good a living as 10. Of course, where population is dense you will try to increase output per hectare to a maximum ; but there are limits to this. The Dutch and the Swiss have the highest net output per ha. of any countries in the world : it is about £35. At that degree of intensity you could employ about 22 workers per 100 ha. and enjoy the Danish standard of living. But the Dutch have 29 agricultural workers and the Swiss 35 per 100 ha., so naturally they cannot earn so much.

The second advantage of the Danes is that they have, almost all of them, compact medium-sized farms. The great majority of the land is cultivated in holdings of 10–50 ha. Further, each holding is a single block, or at most two, not the hundred-and-one parcels which are typical in France and much of Eastern Europe. In consequence the Danish farmers have been in a position to take advantage of scientific developments ; their fields have been large enough to drain and to cross-plough, their holdings substantial enough for them to afford good livestock and good buildings. Another result has been to make the farming community equalitarian and democratic ; all farms being much the same size, all farmers have much the same status socially and have been willing to co-operate together to a degree that would be quite unthinkable, for instance, in Britain.

The third great advantage of the Danes is the high general level of education. And here I mean not education in agricultural subjects—their technical schools for farmers are not conspicuously better than similar ones in the Netherlands and elsewhere. I refer to their education in general subjects that the farming community has obtained chiefly at the Folk High Schools. Once an interest in knowledge has been aroused and young people are trained to absorb it, then teaching of specifically agricultural subjects becomes possible and profitable. In France I have been told not by one but by several of the teachers in agricultural

schools that they found the students so unformed mentally, so backward generally, that the teaching did not get across. Much public money was spent, but the benefits were small. I am quite sure it is this general background of education, together with the equalitarianism already mentioned, which in Denmark made co-operation possible and successful. It also gave the farmers a lively interest in technical problems. Nowhere else are milk-recording figures so energetically discussed, nowhere is farm book-keeping so enthusiastically undertaken.

The practical outcome of all these advantages has been for the Danes a standard of living 50 per cent. higher than the rest of Western Europe and two or three times as high as the standard of Eastern Europe. Let me repeat these chief characteristics which seem to lead to prosperity. Highly farmed land with plenty of arable and high yields per ha., a quantity of livestock much larger than could be supported on home-grown fodder, farms of moderate size, a comparatively sparse farm population, but a population highly intelligent and progressive.

Very interesting, you will say, but what is the good of an example such as this to the majority of European countries, notably the Balkans, where all the factors seem adverse? The difficulties, I know, are real ones and must not be shirked. Consider the problem of over-population. In Poland there are 38 persons engaged in agriculture for every 100 ha. of farm land, in Rumania 38, in Bulgaria 41, in Yugoslavia 52. The Balkan countries have been increasingly aware of this problem for the last twenty years, but found no solution. Prior to 1914 they had some outlet in emigration to the United States; after the last war that ceased. Opportunities for industrialisation were few and small; Europe had between 1920 and 1940 such an insane medley of tariff barriers and so little inter-State lending that the poorer countries could not successfully launch any considerable industries. Moreover, the population was still increasing rapidly, so that the situation got worse. One result was to drive the price of land up to ridiculous heights. So great was the desire to obtain a plot, however small, for your son or your son's son that you were prepared to put all your life's savings into the purchase. Indeed, savings which might have been spent on improving the parent holding had to go to buy, in the teeth of fierce competition, another piece of land to prevent the next generation from starving. In Switzerland, where this sort of thing happens, I have seen patches of not specially good land fetch more than £500 per ha., and in districts of Eastern Europe the price goes even higher. It is not much use devising grand schemes for lending peasants money as long as they feel obliged to spend what they possess on speculations of this kind.

The second great curse of European farming is what the French call ' parcellement,' the division of a single farm into innumerable tiny strips. I myself have seen in Switzerland a holding of 6 ha. consisting of 65 separate plots, but that is mild. There are in Switzerland some 220 holdings each less than 1 ha. in size and each divided into 50 or more plots. In France, in the Meuse Department, an example is quoted of a farm of 30 ha. composed of 2,000 individual parcels. Under conditions of this sort rational cultivation is quite out of the question. The peasant is tied as to what crop he can grow by the cropping of his neighbours; he often can only reach his strip by crossing their strips; he is frequently involved in legal disputes as to the boundaries of the unfenced plots; last but not least are the extra costs incurred in cultivation; it has been calculated that the costs of wheat-growing are twice as high on a plot a fifth of a hectare in size as on a plot one hectare in size. This state of affairs, as you know, is partly a hang-over from the medieval system, from the enclosure of the open fields. But it is partly also the result of equal inheritance. Each child wants his due share of the good land and the bad, of the meadow, the ploughland, and the vineyard. He gets it and then marries a girl who brings a similar set of strips. By dint of much effort in exchanging, in buying and selling, he may succeed during his lifetime in consolidating the holding from, say, 40 to 10 strips. But when he dies and the farm is split up, the whole process begins again. It would be difficult to overestimate the magnitude of this problem. In Switzerland one-third of all the farm land is afflicted with this curse; in France, Germany and Belgium one-fifth to one-quarter. Holdings throughout most of Europe are already too small because of the density of population, but this curse of ' parcellement ' unnecessarily aggravates the problem.

There is a further most important factor which is not easy to reconcile with peasant prosperity, and that is the desire for self-sufficiency in food supplies. Let me say at once that it seems to me a perfectly natural desire and, in the political circumstances of the modern world, a perfectly reasonable one. If before this war it seemed to many countries prudent, it will now seem indispensable, for those which had made themselves most self-sufficient are those which are suffering least deprivation of food supplies under the present ordeal. Yet self-sufficiency, or a degree of self-sufficiency, was only achieved at a high price. The Swiss have had to pay their farmers four times the world price of wheat so as to produce 30 per cent. of their requirements at home. The French having had a tariff on wheat since 1885, grow all they need at home, but it takes a million man years to do it, whereas a quarter of a million would be sufficient if farming had not stagnated. Three-quarters of a million wasted men! And despite their long years of tariff protection French wheat growers do not enjoy a comfortable living. You could hardly expect it. The great majority of French growers produce less than 5 tons of wheat a year. Their holdings of land are so small that they cannot produce much in the way of dairy produce as a supplement; indeed their total gross output of foodstuffs averages not much above £200 per farm, out of which they have to pay all expenses and reap a living for themselves. Naturally they are not rich. But they could have been far less poor if they had developed a strong livestock industry as their chief concern based on home-grown and imported fodder. The smaller a man's acreage, the more important that he should have a large turnover, and that means livestock and market garden products rather than

cereals. But France knew she was living in a crazy world, and in such it is often foolish to pursue wise policies.

I have said little about technical progress and efficiency. Agricultural science is advancing at a prodigious rate in many fields, and is putting within our reach the power of producing all the food we need with but a fraction of the present farming population. Yet how great is the contrast between what is and what might be, more striking in agriculture than in any other human activity. The need of the immediate future is not so much more research, but determination to get existing knowledge across to the farmers and peasants. That cannot be done merely by importing better-class breeding animals, granting peasants credits to buy machines and so on. Merely to do that is to build your house upon the sand, as long as the capacities and environment of the peasants themselves do not permit them to practise the new methods. It is a waste of public money to grant agricultural credits on a large scale if all that happens is that the peasants spend the money on buying land, pushing its price up to quite uneconomic levels. It is waste of public money selling peasants high-quality animals, if they cannot afford hygienic buildings to house them in ; it is equally waste to hand out expensive machinery to holdings which are so small that the implements remain unused 51 weeks out of 52. Prosperity has never been accomplished that way. I am convinced that we shall have to go much further back and bend our efforts to changing the much more fundamental factors which influence the peasants' economic welfare. If we want to build a modern house we must start by putting in solid foundations.

We return, therefore, to our original question : what are the factors which determine prosperity in agriculture ? First, both in importance and in time must, I am sure, come education—general education. In no other major industry except agriculture do we expect hundreds of thousands of individuals to be capable of running an enterprise. In iron and steel or coal mining the *entrepreneurs* are a few dozen men ; in farming they are millions. It follows that for farming a high level of general intelligence is particularly necessary. Whether you decide to do it by raising the school-leaving age or by some scheme of adult education like the Danish Folk High Schools, or both, will depend upon the tradition and experience of each country, but until it is done most other efforts at farming progress will be in vain.

The second step would be to re-draw farm boundaries, consolidating the strips, building compact and, wherever possible, reasonable-sized holdings. The Germans made some start on this before the war and the French have initiated schemes in a few districts. Peasants usually oppose these schemes at first, though once done, they come to appreciate the enormous advantages. But to succeed re-grouping must be accompanied by regulations limiting the amount of sub-division allowed under inheritance, else again public money is wasted and the work undone each generation. It would take twenty years' very hard work to complete all the re-grouping which ought to be done in Europe and, incidentally, it would provide a very useful type of ' public works ' for the absorption of unemployment.

This brings us to the third factor : the need to relieve population pressure on the land. Not of course in Denmark and France, but almost everywhere else in continental Europe, there are more people on the land than can possibly achieve a reasonable standard of living there. What can be done with them ? The solution lies outside the scope of this paper because it involves the prospects for industrial development. Suffice to say that the task for Western Europe is to try and maintain full employment in the industries it has, while for Eastern Europe it may be to build up new industries. In so far as this can be done a transference of labour out of agriculture becomes possible. Europe could produce all the food necessary for a high level of nutrition with half or even a quarter of its peasant population, while on the other hand the demand for manufactured articles is almost insatiable. It might well be one of the principal tasks of European reconstruction to plan for this end. It would benefit the consumer and equally the producer of agricultural products.

Producers would benefit not merely in those countries which need population pressure relieved, but producers everywhere would find an expanding market, especially for the ' protective foods '—dairy products, eggs, fruit and vegetables. A trend of this kind is vital to agricultural prosperity. As I have already emphasised, in a crowded continent like Europe peasants cannot possibly earn a good income as long as they concentrate on grain production. For that you need plenty of land for each farm family. The only hope of prosperity on a small patch of ground is in dairying or market gardening. It is, therefore, of the utmost importance that governments should do all in their power to promote these types of farming : for instance, by subsidies to technical improvements in livestock, by organisation of co-operative grading, packing and selling of eggs, fruit and vegetables, by a price policy which makes these lines of production decisively attractive to producers. It is sometimes argued that even if cultivators did go in more for these products they could not find markets. That has certainly been true in the past. That is why the farming prosperity of the future depends so much on the extent to which governments can maintain full employment and a steadily expanding industry, for nutritional surveys have shown conclusively that the consumption of the protective foods would in most countries of Europe be doubled, as it should be from a health standpoint, if the workers could afford to pay for them. That is why farming cannot really prosper except when the whole economy prospers.

Finally, there is a whole group of reforms which promote farming efficiency and can best be undertaken co-operatively or collectively. There are the forms of co-operation already known to you : credit associations, insurance societies, animal breeding clubs, bookkeeping societies and the rest. But new forms are now being developed. I have particularly in mind the co-operative ownership of machinery and implements, which during the present war has been widely developed, for example in Yugoslavia. This may come to

prove a very satisfactory way of marrying certain economic advantages of collective organisation with the individual enterprise of the peasant cultivator. Machinery has hitherto been considered the prerogative of the large farm, but in the last few years significant strides have been made in adapting it to the small man's needs. A machine like the auto-culter should soon be within reach of every cultivator of 4–5 ha. of land, and should immensely lighten his toil.

I can leave it to others to discuss the scope of co-operative activity in electricity and drainage schemes, in marketing of produce, in rural hygiene and welfare. But I would stress again that progress along these lines will be slow and feeble unless greater attention is paid first to the much more fundamental problems of education and of creating sensibly shaped and sized farms.

What I have said in this paper about economic prosperity has, for the sake of brevity, necessarily been in general terms. Some of the comments apply to Eastern Europe more than to Western, others *vice versa*. But the basic economic forces remain the same everywhere and are inescapable. They may be summed up as follows. For a family to attain a reasonable standard of living at mixed farming some 10 to 50 ha. are necessary. Further, that standard is likely to be a good one if the cultivator has a large turnover and high output per acre, such as he gets in dairying, egg and vegetable production. His standard will be still better if he has enjoyed a good education and is prepared to co-operate with his fellow producers, pooling experience and gaining in strength. This is the natural plan for prosperous farming in a crowded continent. In some countries the achievement of such a pattern will take much longer than in others : but it can be the goal for all. How rapidly we can advance in that direction will depend on the general level of economic welfare, the extent to which the industrial populations can acquire the purchasing power to satisfy their nutritional requirements, which in turn depends on the confidence nations come to have in each other and in their ability to organise collectively world peace.

Dr. W. Klatt

POST-WAR reconstruction of European agriculture must—if it is to be worthy of the name—not only obstruct tendencies making for new wars, but, if possible, remove altogether the agricultural causes of war.

This would be entirely in the interests of the European peasants. The events of the last few years have clearly shown that the peasants have in no way profited from rearmament. In spite of being fully employed, the German workers consumed in 1939 less protective foods—the chief products of peasant farming—than they did ten years before. Also, the import of these foods from Denmark and Holland was considerably less than ten years before. No one stated these facts more clearly than Goering when he launched the Four Years Plan under the slogan of ' Guns instead of butter.' The production and consumption of butter and other high quality foods were sacrificed to crops—less profitable from the point of view of the peasant and the national health, but better suited to the rearmament programme.

Goering said ' Guns instead of butter.' But guns—though Goering never said this—meant for the peasants grain instead of butter. After decades of a high grain tariff, protection was even further extended during the last few years before the outbreak of war. Grain was regarded, quite rightly, as one of the fundamental war products. Its production was encouraged as much as that of substitutes and plastics ; not only in Germany, but, in competition with German rearmament, in nearly every central and west European country.

Here we come to one of the most important problems of European agriculture. During the last ten years European agriculture has been characterised by a permanent crisis. The basic cause of this crisis was that the artificially protected grain production of West and Central Europe came into conflict with the unintensive, backward farming methods of the over-populated grain-producing countries of East and South-east Europe.

In Eastern Europe the farming population at the outbreak of war was twice as large as in Western Europe, the yield per acre and the price per unit were about half as high. Therefore, the purchasing power of the peasant in Central and Western Europe was five to ten times as great as it was in Eastern Europe. In these circumstances the intensification of farming in Eastern Europe was almost impossible. The consumption of fertilisers and agricultural implements was only a fraction of that of Western Europe. Therefore exports from the East consisted mainly of ' hunger-exports ' subsidised by taxes on sugar, salt and similar goods. On the other hand, the cost of living of the industrial worker in Central Europe was raised so much through agrarian protectionism that it was impossible for many industrialists to compete on the world market. And so they were compelled to carry on inside their own countries—and that meant in many cases, at least in that of Germany, production for the army. And so the vicious circle was complete.

If fundamental changes are not made here after the war then this chronic agricultural crisis cannot be avoided ; and after a short period of peace new war-dangers might again appear, as they did after the last war. Only through complete international integration can new wars be avoided. Every form of autarchy is a potential war-danger, whether it be within the territory of a single great power or in Europe as a whole.

Imagine for a moment that Germany was dependent for 50 per cent. of her grain supply, Japan for 50 per cent. of her rice supply, on imports from distant countries, then perhaps there might never have been a war. In any case great imports would have indicated much sooner the preparations for war. If the important essential foodstuffs, bread- and fodder-grain, had had to be imported in this way from overseas, then the exports of industrial goods would have been easier. This does not mean that the return of a free world market is to be expected or desired, but on the other hand a world market, preferably a planned and organised world market, of far greater scope than in 1939 was possible.

But there is still another item which will benefit European agriculture and peasantry more directly. The peasant's real interest is not in the production

of high-priced bread- and fodder-grain, but in the import of cheap bread- and fodder-grain. Then the townsman can spend more on protective foods because of the cheaper bread prices, and the peasant can produce these foods more cheaply because of the low prices he pays for the imported fodder. If grain tariffs in Europe were reduced gradually, and the balance were shifted in the direction of the products of intensive farming, then European peasant farming would finally be developed in the way most suitable for it. The industrial centres of Europe should, like the eastern states of U.S.A., be surrounded by zones of market gardening and market dairy-farming. The production of bread- and fodder-grain should finally be shifted more and more into the zones to which it economically belongs, i.e. to districts where each person works 100 acres and more, and not 10 acres or less. Problems such as the over-population of farming districts, high land-prices, small allotments, and a larger market for industrial goods in agriculture, would be much easier to solve under this plan. This, however, still appears almost impossible to-day to those agriculturists who still regard agrarian-political and economic conditions as more or less fixed and unalterable.

It has become more and more apparent in recent decades that even the barriers which exist through conditions of climate, soil, and topography can be altered. Technical advances such as the cultivation of frost-resisting wheat, or the speeding-up of sea transport and the improvement of refrigerating methods have since the turn of the century revolutionised the grain production of Canada and the meat production of the Argentine. And technical advances such as the construction of baby-tractors, the perfection of the silage process, the use of artificial fertilisers and artificial insemination may revolutionise European peasant farming within the next ten years.

I purposely include in my argument not only the central and west European states, but also the eastern and south-eastern states. They too must finally free themselves from the backward conditions under which they have become merely the European granary. A gradual change-over to the production of protective foods is quite possible for them too, though probably not to the same extent or for exactly the same products. As we know from the studies of Sir John Orr and the Nutrition Committee of the League of Nations, there will be an unlimited market for some time to come for large quantities of protective foods. Before the outbreak of war twice as much meat per head was eaten in England as in Czechoslovakia, five times as much sugar as in the Balkans, and ten times as much butter as in Italy.

I do not believe that the objection is really sound, that such a complete change-over to intensive agriculture would be too expensive to be carried out. To take one example, if it was possible for Hitler to extract from the German people in five years of war preparation and two and a half years of war almost 20 thousand million pounds, that is, three times the yearly income of the German people ; and if Hitler's post-war plans for the German peasants involve an investment of only 2,000 million pounds for the next ten years—then I find it hard to believe that it is financially impossible to carry out the much more moderate programme of the reorganisation of peasant farming, the greatest consumption-goods industry in Europe.

There can be no difference of opinion over the fact that the present and perhaps the next generation of Europe will have to work almost as hard as the people to-day. There is also no doubt that reconstruction will only be possible through investment and material help from outside Europe. But the question will be whether this help will again be granted unconditionally—as it was after the last war—thus making possible the expansion of reactionary forces such as the Prussian Junkers, who are at the same time owners of the grain farms east of the River Elbe, leaders of the German army, and large shareholders in the German armament industry—men who have always placed their own interests before those of the working population in town and country.

I think that every far-sighted person whether European or non-European, every real patriot in every European country desires those political, economic, and social pre-conditions which are essential for international co-operation and integration, and which will make once and for all impossible any attempt at partial or total isolation or self-sufficiency by any individual state or union of states.

All this, however, cannot be accomplished by agrarian-economic and technical means only. It is a major politico-agrarian problem. Only after the power of the big landowners, whose interests lie mainly in grain production, has been broken, will the way be free for the peaceful and prosperous development of European peasant farming.

M. Arnold Dániel
Land Reform in Hungary

THE countries of Eastern Europe have an agricultural over-population. Hungary has a less dense agricultural population than its eastern and southern neighbours, because it is comparatively more industrialised. Nevertheless, effects of agricultural over-population are felt also in Hungary. This is caused by the distribution of the land property, in combination with other circumstances.

While in Rumania, Yugoslavia and Bulgaria the land is now distributed into peasant farms, and we find estates only in small number and size, Hungary is a country of large estates, and the share of the small farmers in the total area of the soil is comparatively small. The agricultural population of Hungary numbers in all 4½ million, of which more than two-thirds consists of labourers without any property and of labourers with a property from 1 to 5 yokes (1 yoke is equal to 1·4 British acres).

This mass of labourers cannot find sufficient employment. High farming is found in Hungary in exceptional cases only. Generally, almost three-quarters of the total of the arable land is devoted to the production of cereals, including maize. With such a system of farming, an agricultural labourer normally can find employment on the estates and on the greater peasant farms only for about 150 days in a year.

Such an overflow of working capacity would

have a bad enough social effect in a country where the land is distributed equally among the agricultural population, but in Hungary, where the bulk of the agricultural population is landless, the effect is sometimes tragic for the labourers. During the agricultural crisis of 1929–1935 a quarter of a million agricultural labouring families had no employment at all, and literally starved.

It is known in Hungary that one could remove such sufferings by increasing the number and area of the small peasant properties. An expert has reckoned that under Hungarian conditions 1 yoke of land in a large farm absorbs about 14 working days in a year, and in a small peasant holding about 31 working days, or more than twice as much.

Since 1906 the demand for the reform of land property has been raised in Hungary and has been supported by a small but growing minority. But not until 1925 was a land reform carried through, by the Bethlen government. The programme of this land reform was on a much smaller scale than the land reforms in Rumania, Yugoslavia and Czechoslovakia after the last war, nevertheless it would have had some importance in its original form ; however, it was only carried out in part.

Properties of less than 20 yokes occupied before the land reform, in the year 1925, about 30¾ per cent. of the total agricultural and forest area, and after the land reform, in the year 1935, they occupied 31·9 per cent. of the total area. This figure is improved a little by the fact that a smaller part of the peasant villages got, by the reform, also a common pasture each ; the total area of these new commons amounts to 80,000 yokes. Official statistics show that the land reform has augmented the individual and common properties of the small peasants and agricultural labourers by less than 300,000 yokes.

The land reform created also larger properties ; for instance, small estates for members of the new order of the 'Braves.' The reform favoured smaller estates in another way also : percentually less area was taken away from an estate of 200 or 1,000 yokes than from one of 10,000 or 100,000 yokes. Such latifundia are also to be found in Hungary. In consequence of the reform, the total area of the latifundia has decreased, and the number and area of the smaller estates have increased.

The land reform of 1925 did not significantly alter the organisation of Hungarian agriculture, and it was no remedy for over-population. Indeed, agricultural labourers had the greatest crisis of their existence just after the land reform, during the years 1929–1935.

As in Yugoslavia and Rumania, it was experienced also in Hungary that the land reform influenced the crops of the country in a not altogether advantageous sense. Small peasants in Hungary harvest 16–18 per cent. less wheat or potatoes, and 6–9 per cent. less maize and clover than the great farmers, according to official figures. On the other hand, animal production, fruit, wine and other quality production is much higher on the small peasant holding in proportion to its area than on the large farm.

After this war a new situation will arise regarding land reforms in Hungary and in other countries with similar conditions. Dividing estates into small farms meant a lowering of production twenty years ago, because the small peasant farm was technically inferior, particularly in working the soil. This technical fact was the mainspring of the collective-farming movement in Russia, which only partly succeeded and cannot be imitated west of Russia. Now, however, small peasant farms can be developed to a high technical level while still remaining on an individual basis.

M. B. Gerritzen
(Agricultural Attaché, Netherlands Legation)

AGRICULTURAL reconstruction after the war is a very difficult subject. When considering reconstruction it is always necessary to find foundations on which plans have to be based. Nothing can be done before it has been decided what these foundations look like.

Before war broke out, agriculture in most countries in the world was kept alive by all kinds of measures taken by the Governments concerned. Schemes followed up by one Government forced others also to do something, and the state of the industry as a whole and the international trade of its products became very complicated structures, rather shaky in the end, as the foundations had been tampered with too much.

At present agriculture in many countries is disorganised, or adapted to abnormal war conditions. International trade in agricultural produce has been knocked to smithereens, and so thoroughly that when considering post-war reconstruction, the problems presenting themselves seem unsolvable.

In addition the British people, for instance, have made up their minds that home agriculture shall not drift back into the unsatisfactory position it was in when war broke out. The question occupying our minds must be what exactly are the British Government going to do to attain that aim ? Are they going to pursue autarchy, are they to consider to a certain extent the interests of the Dominions, or also the interests of farmers in foreign countries ?

In contrast with Great Britain, I take the Netherlands. Though importing produce of agriculture, as e.g. wheat for human consumption and maize for livestock, that country exported articles produced by a very intensive agriculture. Natural and economic conditions predestined her to that state of affairs. If agriculture in the Netherlands were to be reconstructed on its old footing, great difficulties might arise. Agriculture was so much dependent upon exports that since 1931 exportation had to be maintained as far as possible by palliatives. When new circumstances arise suddenly, reorganisation of the industry cannot be attained overnight ; even if schemes have been worked out, it takes a long time to bring them into bearing. When plans of reconstruction have to be projected for the Netherlands it seems to be common sense for her to take heed of circumstances obtaining and the schemes to be brought into operation in other countries after the war. Autarchy would be disastrous for the Netherlands.

Apart from natural circumstances agricultural reconstruction everywhere will to a large extent

depend upon marketing possibilities and prices at home and abroad. How will marketing possibilities be provided? Will prices be regulated? If Great Britain is to maintain a flourishing agriculture, of course remunerative prices for farmers will be a necessity. How are prices to be controlled? Will British policy be based on sound agricultural economics? What will be her attitude as regards imports? High duties, with concessions to the Dominions, making the sale of products at remunerative prices for foreign countries almost an impossibility? Will there be quotas linked up with remunerative prices? Are imports to be arranged by central bodies or will they be conducted through the channels existing before the war?

Is the Netherlands to reconstruct agriculture in the same attitude of mind, or in a way suitable to her circumstances? Are central export bodies to play a part? In general, is agriculture in each individual European country to organise or reconstruct itself, be it under Government direction or not, solely according to national views which may be partly based upon inducements to establish an export trade at all cost? If the answer is in the affirmative all kinds of difficulties, old and new, will arise in the countries themselves and amongst nations, in connection with production and prices. The development of agriculture coupled with distribution of its produce in Europe and consequently all the world over will run a chaotic course. International jealousy and national selfishness will soon give rise again to conflicts in the economic field. Government interference will be rife and we are drawn back into the vicious circle of features like subsidised agriculture, subsidised exports and similar measures of economic warfare.

Autarchy generally applied will not be a satisfactory solution for the majority of countries. If world calamities are to be prevented in future, it will not be desirable for each individual country to try to work out its own salvation without some consideration of the influences its methods may have upon agricultural developments in other countries. At present it is not easy to compose a clear picture of the state of European agriculture, and definite plans for reconstruction are difficult to draw up. Yet it seems opportune to investigate whether it would be possible to establish universal principles for planned production and for marketing and distribution of agricultural produce as a foundation of schemes for rational agricultural developments on a European basis. Schemes of reconstruction could be founded upon these principles and brought into operation when the war has been won, if, of course, the Governments are prepared to co-operate.

Investigations and studies in this province might be a task for an international committee of economists and agricultural economists, who individually should be able to rise above prejudices accruing from exaggerated patriotism, without on the other hand being blind to specific and essential interests of each country in regard to its economic disposition. The principles arrived at and schemes to be suggested should be based on commonsense or scientific considerations, which inherently have the same meaning.

I am convinced that work of a fundamental nature is necessary before rational constructive schemes for individual countries can be drafted.

If peace can prevail in the agricultural realm of a country like the United States, a peaceful arrangement in Europe and even in the world seems a not unattainable ideal.

Mr. J. W. Reid (*communicated*)

THE problem is two-fold: (1) measures to be applied immediately on the cessation of hostilities; (2) long-term policy.

Immediate Measures.—These involve amongst others:—

(*a*) Supplies of food: (1) for human population, (2) for animals.
(*b*) Medical relief.
(*c*) Housing: (1) human, (2) animal.
(*d*) Power equipment: horses, tractors, ploughs, drills, etc.
(*e*) Re-establishment of herds of livestock.
(*f*) Personal contacts: education and training.

In connection with (*a*) I should like to suggest that supplies of food, presumably canned food, should be made up in small-sized containers, e.g. 12 oz. or less, to simplify equitable distribution and reduce wastage. After the earliest deliveries larger containers could be used.

With regard to housing I was much impressed with Mr. Brooks's suggestion of sectional housing. Could a survey be made of existing sectional equipment suitable for the purpose, or could plans for suitable equipment be prepared now so that some of the war factories could switch over rapidly to production when required? It might be wise to bear in mind that sections should be of light weight so that one man, and maybe a weak man, can handle them, since mechanical equipment for handling and transport may be impossible.

In connection with (*e*) it occurs to me that some steps should be taken now to make provision for the need which will arise of ensuring adequate supplies of livestock quickly. The need for sires is obvious, but I think very large numbers of females may be required, and nearly four years elapse between conception and production in the case of a dairy cow. Something might be done by ensuring that approved herds—the stock sent should be of good quality—in this country, in U.S.A. and Canada, and indeed in any country not overrun by the enemy, are maintained in adequate numbers to meet at least primary requirements. Would it be advantageous to ensure that every suitable heifer calf is reared, particularly in North America, where presumably ample fodder and grain is available?

So far as (*f*) is concerned it should be possible to provide facilities in this and other free countries to train a nucleus of technicians, e.g. in animal husbandry and in the proper use and maintenance of machinery.

Long-term Policy.—Can Europe alone be considered? Basis of a long-term policy must be the provision of adequate food supplies for the human population of the world at prices that all can afford to pay; a standard of life for each nation that will ensure freedom from want, physical well-being, cultural attainment and the right development of leisure; and freedom from fear to ensure

stability and development of moral and spiritual character.

It thus involves consideration of the problem on a world basis, for speed of communication, development of transport, and artificial stimulation have developed competition where the real need is co-ordination. For example, is it sound policy to suggest that food should be processed in Europe to a large extent if the Americas are developing an economy involving the export of processed foods?

The problem should be capable of solution, given goodwill and a realisation of its vastness, given commonsense and an unbounded optimism. Thus the food requirements of every nation can be estimated fairly accurately, as can be their productive capacity. It should be possible to calculate that, say, 50 per cent. of a nation's requirements can be met by home production, leaving 50 per cent. to be met by importation. The next step would be to determine what type of production should be done at home, what imported. Here the potential of each country can be assessed, and a rational scheme evolved for all.

For example, what place is the pig to have in British agriculture? Is it to be kept mainly for processing imported cereals or for utilising waste and by-products? Is it to provide 30, 50, or 75 per cent. of pork or bacon requirements? From what sources is the balance to be made up, and in what proportion? Is it a better policy for Canada to develop bacon production for export to Britain or for Denmark or Poland to do so?

What is to be the relative importance of wheat and rice? Asia will have vast problems also.

May I suggest that something in the nature of an Agricultural Development Board be set up in each country, in touch with corresponding Boards in all countries?

Such Boards would control policy, co-ordinate development and stimulate initiative. They would be directive and consultative. Under their general direction would be three types of operative Boards: (1) Production Boards to regulate and stimulate home production, (2) Import Boards to regulate and control importations, (3) Distributive Boards to organise marketing and distribution to the consumer.

No light task, but surely within the scope of men of goodwill.

THE FUTURE BETTERMENT OF EUROPEAN FARMING

Saturday, March 21: Morning Session

Ambassador Anthony Biddle, Chairman

I CONSIDER it both an honour and a privilege to preside at this meeting of your distinguished Association. I am aware of its energetic and constructive rôle in the advancement of science, in its service to humanity. By providing the medium for free, enlightening, useful discussion, your Association is importantly contributing towards rallying collective energy behind the furtherance of scientific development, and thus towards the uncovering of fresh vistas of social progress. The scientists from all quarters of the United Nations front are to-day contributing their valuable share towards victory, by perfecting and making even more effective tools and engines of war. At the same time, however, they stand ready, as we have heard their spokesmen declare in this very hall, to devote their energies towards winning the peace. Indeed, the rôle of scientists in shaping human affairs of the future, in recasting the things to come after the war, is of incalculable importance.

To be presiding at this meeting where we shall have the pleasure of hearing discussions on post-war agricultural reconstruction, is for me of particular interest, in that this is a matter of vital concern to the countries to whose Governments I have the honour of being accredited. I have lived in several of these countries, and fully realise what acute agricultural problems have been developing during their respective periods of occupation.

Moreover, among other reasons for my particular interest in to-day's discussions is the fact that my father-in-law, about eighteen years ago, before his untimely end, founded the 'Boyce Thompson Institute for Plant Research.' Here a number of agricultural problems of my own country have been studied and worked out to resultant useful solutions in the service of the community. I am happy to say, moreover, that the scientists engaged at this Institute have carried out successful research work in connection with speeding up the process of food production.

Indeed, the research and experimental work which has been done from a scientific and commercial point of view, on both sides of the Atlantic, may save thousands of people from starvation at the close of the war. All work dealing with the speeding up of germination of seeds and the revival of dormant fertility is now a matter of utmost importance.

Sir John Russell, in his paper on the re-establishment of the 'scorched earth' which he read before your distinguished body last September, sounded an important note in terms of post-war requirements. He spoke of large areas of Poland and Western Russia which are now suffering an unprecedented devastation. This, as we know, and he so clearly pointed out, is in large part due to the strict adherence of the Russian people to their 'scorched earth' policy—their courageous and traditional way of meeting the advance of the invading forces. This means not only the burning of their villages but also the destruction of livestock, crops and all that they are unable to carry away with them. These conditions will call for large-scale post-war relief and agricultural reconstruction in the regions thus affected. Fortunately, much which has been achieved in

the way of soil classification as well as surveys, by Russian soil science, may be expected to serve usefully in the recovery of crops.

However, Russian agricultural reconstruction will undoubtedly meet with serious problems. The restoration of the crops will require, among other factors of important consideration, the supply of various types of good seed. Scientists have done outstanding work in Poland as well as in Russia, in the selection and raising of the drought-resisting types of crops suitable to various regions throughout their country. I sincerely share Sir John Russell's feeling that the utter destruction of the stocks of these types would be a dire misfortune. Indeed, it would entail a labour of many years to raise and grow them in number again. I therefore concur with his opinion that it is urgent that the present predicament be met by steps to take over and preserve the most important varieties. Moreover, I agree that a valuable contribution towards this end would be, if agricultural organisations in the United States and Canada were to see their way clear to take over pedigree stocks of the most important types and maintain them, increasing those required for seed, and retaining research stocks for the day that they will again be required.

Another problem which may be expected to entail great difficulties will be the re-establishment of the farm livestock. The increase of livestock is a slow and difficult process, requiring among other factors access to a good breed of stock. As it may be assumed that the breeding stocks in Poland as well as in Russia have been killed off with the rest of the animals, this factor may be expected to prove a difficult one after the war. In the process of re-establishing the livestock artificial insemination will undoubtedly play an important part. The Russian scientists, by developing a special technique, have made great advances in this work. Indeed, it would be of great help and service if, in the case of livestock as in the case of seed, the British, as well as the American and Canadian agricultural organisations would bear in mind these post-war problems, and would contribute toward the solution thereof, by getting themselves organised and in position to supply the breeding stocks for the re-establishment of the livestock in Poland, in the ' scorched earth ' areas of Russia and in other countries of the European Continent where the livestock has suffered great losses.

Miss Margaret Digby

The European Farmer and World Agriculture

THE problems of European agriculture are not self-contained. Even when an attempt is made to insulate them, they react negatively on the agricultural and industrial economy of other states and continents, and any approach to a solution must take into account the position of overseas agricultural countries and of a great importer of agricultural produce like Great Britain. Nor can Britain and the overseas countries hope to see a stable and prosperous Europe if they are not prepared to study sympathetically its agricultural problems and make some practical contribution to their solution.

The reconstruction of European agriculture after the war must have for its first aim a rapid increase in the production of foodstuffs, first for the self-support of each European country, and secondly for export to its immediate neighbours. This, however, is essentially a short-term policy and, unless it is recognised as a stop-gap, without necessary bearing on the more considered development of European agriculture, it may do little to promote future agricultural prosperity. Something based on larger and more permanent considerations is required, and it is desirable that those concerned with the future of agriculture should not wait too long before formulating their programme. Even relief measures, when they may last for a year or more, and take the form of rebuilding a great national industry like agriculture, are difficult to plan unless there is some picture of the final results intended. Moreover, European agriculture cannot be planned in a vacuum since it affects and is affected by the agricultural policies and practices of the overseas countries, both temperate and tropical, which are its competitors, and of the industrial countries of Europe, notably Great Britain, which are the markets for its surplus produce. Even before Relief has merged into Reconstruction—and where agriculture is concerned the demarcation is particularly shadowy—we are confronted with the question whether we should aim at reproducing pre-war conditions or preparing the way for some new agricultural lay-out more favourable to the interests of continental Europe, Britain and the overseas countries.

Although agricultural reconstruction will naturally aim first at making good the losses of war in livestock, equipment and soil fertility, it must not be forgotten that even before the war it was only in a few European countries that agriculture was really doing its two-fold job of producing foodstuffs efficiently and providing a fair livelihood for the agriculturist. This was all the more remarkable when it is remembered that throughout Europe agriculture is a prime national concern and the support of anything from one-third to four-fifths of the population. The obstacles to agricultural prosperity (which did not affect all countries equally) were :

Firstly, there were more people on the land than agriculture could support, at least with the organisation, the capital and the technical equipment then at its disposal. This was especially true of Eastern Europe with its high birth-rate and limited national resources.

Secondly, in many countries which were not really over-populated the State was trying to keep a large population on the land for military and political reasons. This was especially true of Germany, but the attitude existed also in France and elsewhere.

Thirdly, and again for military reasons, the State wanted to be self-supporting in bulk foodstuffs (cereals, sugar) best suited to large-scale farming and in which the relatively small-unit cultivation of Europe could not compete with the wheatfields and cane plantations overseas, unless heavily protected and subsidised. This was mainly a problem of Western and Northern Europe, though some south-eastern countries have fostered high-cost home sugar production. The two foregoing policies led to an attempt to in-

sulate the agriculture of each country from world agriculture by tariffs and other barriers, an attempt which, with modern methods of production, preservation and transport, could only prove exhausting and stultifying.

Fourthly, owing to such restrictive measures, applied not only by agricultural but by industrial countries, and to low standards of living in industry, there were insufficient markets for surplus produce, and prices were too low to bring the grower any adequate return. Eastern Europe, the main exporting zone, was perhaps the principal sufferer, but countries like Holland, which had built up an export trade based on a continued high-quality demand and relatively free trade, suffered grievously when markets contracted at the time of the great depression.

Fifthly, capital and technical knowledge, which might have raised European agriculture to competitive efficiency, were lacking in many countries and were often beyond the power of the national government to supply, particularly when the reward of enterprise remained problematical.

The result was that, in a considerable range of European countries, agriculture was technically inefficient, the agriculturists ill-rewarded, the cost of living excessive and the national diet inadequate. Meanwhile the overseas countries, with their large populations dependent on agriculture and their almost ideal conditions for certain types of production, were shut out of their former markets and surpluses of wheat and maize, cotton and sugar were steadily accumulating.

During the war a certain coherence has undoubtedly been imposed on European agricultural economy by the dominant demands of Germany. There has been an attempt, probably to some extent successful, to fit production to a thought-out plan of consumption. It will not have been more than partially satisfactory to the agriculturist since, quite apart from his resentment of political oppression, (*a*) the promised payment in industrial goods for his produce will have been largely illusory, and (*b*) the shortage of labour, fertilisers and feeding stuffs will have reduced agricultural efficiency and consequently output.

It may perhaps be agreed that it is not desirable that reconstruction should perpetuate either German economic dominance over agricultural Europe or the artificial and mutually injurious pre-war policies of European states. Some revised outlook is required, consonant with modern conditions and acceptable to the widest range of countries. It is suggested that the general object should be to set going a type of agriculture which will enable the largest number of people, agriculturists and others, to enjoy the best obtainable standard of living.

The long-term programme might run somewhat on the following lines :—

(1) Better nutrition and the production of protective foods. The new outlook on food is securing steadily widening acceptance, both scientific and popular. It opens a new field of demand comparable to the demand for industrial goods awakened and fulfilled by the industrial revolution. Satisfaction of this demand conveniently coincides with more intensive farming and the possibility of supporting a relatively high rural population.

(2) More efficient farming, since no industry can prosper which deliberately wastes materials and effort. Efficient farming, which for this purpose may be defined as the best use of available resources, including labour resources, to produce goods really needed, requires capital at the outset, but in the long run reduces the need for protection with its adverse repercussions on the agriculture of other countries.

(3) Wider markets involving both larger areas of free or relatively free trade and higher standards of urban consumption. The second means a prosperous industry and full employment which may well hang on reciprocal access to rural markets. In this connection a warning may be inserted. The self-sufficient peasant is an attractive figure, but in modern conditions he cannot compete in standards of well-being with the efficient producer for the market, whether industrial or agricultural.

(4) The introduction of a measure of planning into international trade to prevent the occurrence of true surpluses and give sufficient price stability to encourage stable production. It may be suggested here that a stable price is more advantageous, both to the industrial worker and the agriculturist, than a fluctuating price which occasionally touches levels highly favourable to one or the other.

(5) Relief of population pressure either through greater personal freedom of movement across frontiers, or through the creation of subsidiary industries or both. With electrical development, new industries need involve neither displacement nor excessive urban concentration of population. A new attitude to migration may be possible after the war.

A policy on these lines would call for certain contributions on the part of the agricultural exporting countries of Europe, of the industrial countries importing agricultural produce and of the agricultural countries overseas.

The European agricultural countries would have to abandon autarchy as a national goal, abandon some of the more artificial and uneconomic forms of agricultural production, and either generally lower trade barriers or group themselves in economic regions within which a natural balance of production and consumption is possible. They would also have to abandon the goal of a large population supported solely by farming, and concentrate on the creation of a technically and socially efficient agriculture well informed, well organised and adequately capitalised. Such a development presupposes a sense of national security which only political measures can give.

The contribution of the industrial countries would be a readiness to import some portion of their foodstuffs, rather than to force home agriculture beyond the level which efficiency and natural resources can attain, and to distribute these imports with some regard to the welfare of Europe, as well as to that of the overseas countries. Joined to this would be a readiness to agree to such stabilisation of international trade in agricultural produce, covering both volume and price, as would give a measure of security to the pro-

ducer. Great Britain in particular could contribute further by paying the higher prices which would result from the creation of a wider market in Europe. British influence would also help the agriculturist in so far as it favoured certain more general policies, as for example, movements towards economic federation in Europe and the re-establishment of international monetary standards.

The overseas countries should, in return for freer access to European markets and a measure of price stability, be prepared for a limitation of genuinely excessive production and for a more liberal attitude either to European exports (including both industrial goods and agricultural luxury products, such as Mediterranean wine and olive oil or Czech hops, which do not compete substantially with their own farm production) or to European emigrants or both. This is largely a matter for the United States and the British Dominions, where agricultural opinion is moving towards freer trade and there are some indications that the association of rising population with rising prosperity is coming to be more widely understood ; where also increasing industrial development is mitigating the reluctance to accept immigrants without capital whose natural future is as industrial workers.

These are all measures affecting the long-term economic policy of a number of states, but without them the short-term approach to agricultural reconstruction advances upon a very insecure basis. With some reasonable hope of an agreed international agricultural policy, a planned reconstruction can be attempted in the immediate post-war period.

But reconstruction, particularly if it involves change, will demand material resources. Any development of intensive agriculture and subsidiary industry in Europe, with the primary objects of raising the productivity of labour and the standards of nutrition, will require considerable capital. It is suggested that reconstruction should be, in part at least, financed by loans through an international bank to be used for promoting the type of agriculture considered desirable. The International Agricultural Mortgage Bank proposed by the League of Nations in 1931, but never actually put into operation, would be a suitable model and might be revived. It would be particularly valuable in promoting long-term improvements, drainage, road-building, improvement of farm buildings, building or rebuilding of processing plant, consolidation of scattered holdings and, in a few countries, creation of new holdings from great estates. It is a question whether short-term credit would not also be required, especially if new types of agriculture are to be substituted for established crops. Agricultural credit systems for this purpose, usually co-operative in character, exist throughout Europe, but at the end of the war are likely to find their assets frozen or expropriated by Germany. These systems will have to be salvaged and reconditioned. Other types of short-term credit might be advances to the growers' marketing organisations and might come not from a bank but from bodies such as a national purchasing board or a co-operative wholesale society which would contract to purchase the crop, or a substantial part of it, when ready for market. The intervention of a national or international bank might be necessary to facilitate such an undertaking where the potential importer was itself a country in need of reconstruction. No credits, whether long or short-term, should be given at random but should be tied to a co-ordinated scheme of development in which the individual farmer would receive through his own national and local organisation just those requirements—seeds, implements, livestock or building materials—which would enable him to restart his farm on the right lines. Further, by encouraging the agricultural co-operative organisations to play a prominent part in the re-establishment of international trade as well as national reconstruction, a spirit of self-confidence and public service is stimulated in the farming community, while the nationalist character of state trading is largely avoided.

Two questions of general policy, outside the purely agricultural sphere, belong to the reconstruction period and will have a strong influence on the recovery of European agriculture.

It is to be hoped that the probable post-war industrial boom will be damped down by financial or rationing pressure in order that it may not outpace the slower fixed rhythm of agricultural production.

Though the economic hegemony of Germany was neither politically nor economically desirable, the destitution of the German industrial population and the failure of its consuming power would have very serious effects on the agricultural exporting countries of Europe unless, as seems unlikely, they could immediately find alternative markets or increase their domestic market by enlarged industrial employment. As soon as the immediate post-war shortage has passed it may be both economically and politically wise to win our enemies with a plenty they have not known for years while securing markets for our agricultural friends.

In conclusion it may be worth trying to disengage from the more general discussion of policy those immediate measures belonging to the period of international relief and reconstruction which can be directed to advancing the particular pattern of European agricultural economy here put forward as desirable :—

(1) Allocation of relief material and of reconstruction loans in cash or preferably in kind should be directed to building up intensive agricultural production of a type naturally suited to each region, capable of absorbing profitably as large a labour force as possible and of contributing first to raising the standard of home nutrition and secondly to the export of produce having a high nutritive and commercial value. This is necessary, not only for the countries with insufficient food resources, but for the exporters, since if relief and reconstruction are not to be wholly charitable they must be paid for with exports and probably with agricultural exports.

(2) The allocation of raw materials and machinery for subsidiary industries in agricultural countries should be favourably considered, even in the early stages of reconstruction when shipping and supplies may be less than normal, in order to relieve population pressure on agriculture and to create internal markets.

(3) The utmost should be done in planning immediate relief to favour intra-European trade in agricultural produce and to free such trade from tariff or currency obstacles. At the same time consideration should constantly be given to the continuance of such trade after the relief period, or, if it is for good reasons only an emergency measure, to see what permanent substitute can be found for it through a change in the character of production or the channels of trade. Such intra-European trade should be encouraged when it springs from the best use of natural resources and contributes to improved nutrition and increased employment, modified if it is a mere stop gap till (for example) normal Australian or tropical supplies become available.

(4) International agreements should be favoured which provide for reasonable overseas imports into Europe, but the agricultural countries should not feel threatened by a competition they are not strong enough to meet nor entertain an idea, however ill-founded, that relief is an excuse for overwhelming them permanently with the surpluses of the New World.

(5) From the moment that international trade is resumed the buying policy of the industrial importing countries, while not ignoring the welfare of home agriculture, should be adjusted to a general plan of European agricultural reconstruction which would allow a sound balance of agriculture and industry, while guarding against a one-sided economic dependence so great as to involve political subjection.

During the present century the advance in agricultural technical knowledge and in knowledge of the use of the value of agricultural produce as food has been rapid, but this knowledge has been very insufficiently, or at least irregularly, applied. The fact that agriculture is at different stages of development in different countries, that even within many countries it has not advanced at the same rate as industry and that this unconformity is often the result of political rather than natural conditions, is one of the primary causes of the poverty and the reasonable dissatisfaction of the agriculturist. A dissatisfied rural population has never been a source of national strength or well-being. The breaking of many political and economic moulds by the war, however painful in itself, does give agriculturists and the agricultural countries a chance to rebuild their industry in conformity with modern knowledge and resources and so make a substantial contribution to raising the standard of human welfare, taking that term to include both the health of the individual and that welfare of the community which is guaranteed by a stable political and social structure.

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A Regional Survey of European Agriculture

It is obviously impossible to predict with any degree of accuracy the course which the post-war rehabilitation of European agriculture will follow, whether for example the tendency will be towards the reconstruction of the types of farming which had been evolved before the war or whether it will be towards new types in response to new conditions. In either case there are definite limits, set by physical conditions, within which developments are possible, and it is the purpose of this paper briefly to examine the factors which limited the types of farming possible in pre-war years and must continue to exercise a limiting control after the war. It is found indeed that Europe can be divided into agricultural regions within which only certain crops can be grown and certain types of agriculture practised, but within which there is often a wide divergence both in intensity and objectivity of farming enterprise.

The first and greatest controlling influence is climate, and here the most significant element is temperature. Passing from south to north in Europe summer temperatures become gradually less whether measured in terms of the average temperature of the warmest month, in the length of the growing season or more accurately in terms of accumulated summer temperatures. Thus within the confines of the continent of Europe one reaches successively the limits of ripening of the chief grains—of rice, maize, wheat, oats and barley. A physical or geographical northern limit is set to types of agriculture based on these different food grains. Within these absolute limits it is often true that the crops which grow near the limits are, if they survive, exceptional either for quality or yield, but the risk of crop failure is great. This risk usually sets an economic limit considerably to the south of the geographical limit, beyond which large-scale cultivation, if theoretically possible, is too uncertain to be economic. It is not easy to draw precisely lines indicating these crop limits because of the existence of 'pockets' with favourable local (microclimatic) conditions outside the main areas. Taking wheat as an example it may be said that the northern geographical limits are reached in northern Scotland, Norway, northern Sweden and Finland, but that, despite the high yield in favoured parts of eastern Scotland (well above the average for England), the economic limit of cultivation on a considerable scale is marked by a line through north Yorkshire, Denmark, southern Sweden and Lithuania. This means that the whole of Norway, nearly all of Sweden, the whole of Finland, Estonia and Latvia lie, and must continue to lie, outside the wheat-growing belt. Barley, able to take advantage of the long hours of sunlight of the northern summer days, extends farther north, actually to within the Arctic circle (Arctic barley).

Although the careful gardener can ripen, in some seasons at least, wonderful heads of corn in Norfolk and elsewhere, England as a whole lies well outside the geographical and economic limits of maize cultivation. The economic northern limit of cultivation is marked roughly by the 70° F. isotherm for July—stretching roughly from Bordeaux in south-western France to Lwow in Poland. Thus, however much their cattle industries may have depended upon cheap imported maize, all the countries of northern Europe—including Belgium, Holland, Denmark, Czechoslovakia and Poland—lie outside the area where a home-produced supply of maize is possible.

Other climatic factors exercise limiting functions. One is winter cold. The intense winter cold of south-eastern Europe renders the autumn sowing of grain impossible and spring wheat takes

the place of winter wheat. Typical plants of Mediterranean lands can stand but very limited amounts of winter frost, and northern limits for the olive, orange and lemon are determined accordingly. So close is the correlation that the limits of the Mediterranean type of climate are frequently defined as the limits of olive cultivation. On the other hand excessive summer temperatures place a southern limit to some crops, notably to oats, which is absent from the Mediterranean lands of Europe where both wheat and barley flourish.

Excluding European Russia and the Mediterranean lands rainfall is rarely inadequate, so that large-scale irrigation is neither necessary nor even desirable ; on the other hand, rainfall is often heavy to the point of being excessive and not only limits the variety of crops which can be grown in economic competition with more sunny lands, but necessitates constant attention to drainage. England and Wales illustrate the general position very well. Where the rainfall is less than 30 inches a year, as it is over most of eastern England, arable crops, such as wheat and barley, grow and ripen well. Where the rainfall is between 30 and 60 inches ripening is uncertain and certain diseases are prevalent and natural conditions tend rather to favour grass. This is the case over most of the lowlands of central and western Britain. It is noticeable that in a dry year the average yield of grain in Britain tends to increase and the yield of hay to decrease ; in a wet year the reverse is the case. Where the rainfall is over 60 inches it can truthfully be described as excessive ; constant attention to drainage is needed to counteract acid conditions of soil and farming of any sort is often difficult.

The various climatic e ments have been used to distinguish a number of ' climatic regions ' in Europe. Some classifications are based on a mathematical analysis of temperature and rainfall, others use the resulting natural vegetation. Some authors have carried this further and have distinguished agricultural regions. These, whilst they are determined by prevailing climatic conditions, are defined by reference to the crops which are actually grown or which are possible.

Before examining these agricultural regions reference must be made to limiting factors other than climate. Broadly speaking, the major regions are determined by climate ; within these elevation and physical features generally play an important part. Soil also plays a prominent part and it is largely for reasons of poverty of soil that rye, ' the poor relation,' takes the place of wheat over large areas of continental Europe.

The rather elaborate summary made by Jonasson of Stockholm University brings out the following regions.

(1) The Tundra Region—no agriculture, ' the cold desert death zone ' into which nearly all food must be brought. Most of Iceland and the extreme north of Sweden and Finland are included.

(2) The Coniferous Forest Region—no agriculture. Includes the central mountain belt of Norway and Sweden.

(3) The Dairying, Hay and Root Crop Region. This is shown by Jonasson to embrace the whole of the British Isles, the northern strip of France, Belgium and Holland, much of Denmark, practically the whole of Germany, the Czech plateau and the western half of Poland. As a major region it serves to emphasise certain common features between the agriculture of Britain and her continental neighbours, but the five sub-regions serve to mark the differences.

A. Hay, dairying and sheep—most of the British Isles except East Anglia, Brittany, western Denmark.

B. Barley with dairying—eastern Denmark, East Anglia.

C. Sugar beet, wheat, dairying—northern France, Belgium, central Germany, part of Bohemia.

D. Small grains, dairying, tree-fruits—southern Germany.

E. Rye, potatoes and dairying—North German Plain and Poland.

(4) The Central Wheat-Wine and Fruit Region. This stretches as a belt embracing most of France across to Austria, Yugoslavia and Bulgaria, with a mountain sub-region embracing the Alps and Carpathians.

(5) The Maize-Wheat Region. This includes several detached areas, coinciding roughly with the maximum maize-producing areas of Europe : (*a*) Rumania, (*b*) Hungarian Plain, (*c*) north of Italian Plain, (*d*) south-western France and north-western Spain.

(6) The Hay-Pasture Region. This includes the mild but moist coastlands of Norway and Scotland where climatic conditions are against any grain assuming serious importance.

(7) The Polar Barley Region. In central and northern Sweden and the northern half of Finland the scattered clearings in the coniferous forests have hay crops and limited crops of barley.

(8) The Oats Region. This covers northern Denmark, nearly all of southern Sweden, southern Finland, Estonia and Latvia—all lands with summers too short and cool for wheat.

(9) The Rye and Buckwheat Region. This embraces eastern Poland and Lithuania and extends into Russia.

(10) The Sugar Beet and Winter Wheat Region—southern Poland and the Polish Ukraine.

(11) The Spring Wheat Region is the Black-Earth Belt of Russia and does not extend into the remainder of Europe.

(12) The Russian Barley Region.

(13–14) The Mediterranean Regions.

A. Humid or coastal with citrus fruit, wine and wheat, in Portugal, south-western Spain and coastal Italy and Greece.

B. Sub-humid or interior with wheat and steppe-like pasture, in the heart of Spain, Apennines of Italy and the heart of the Balkans.

(14) Semi-arid barley, wheat, olives and pasture in eastern Spain, Sardinia and the driest parts of Italy, and eastern Greece.

The Intensity of Agriculture in Europe.—Generally speaking the agricultural regions just enumerated are determined primarily by natural conditions of climate, topography and soil, but within them the concentration on certain crops or types of farming is the result of deliberate choice or policy or, it may be, of historical causes. Thus the emphasis on sugar beet in continental Europe long before this crop was seriously considered in Britain and, on the other hand, the

emphasis on sheep in Britain are by no means explicable on a purely physical basis.

It is the same when one considers the intensity of agriculture. To some measure this reflects favourable physical conditions, to some extent local needs or initiative, to some extent deliberate policy.

On a broad scale Ellsworth Huntingdon has shown the especially favourable conditions which prevail in the countries abutting on the southern North Sea. He has calculated the actual productivity of the land by taking the yield per acre of eight widely raised crops (wheat, rye, barley, oats, maize, potatoes, sugar beet and hay). If the average for Europe is represented as 100, Belgium = 179, Holland = 170, Denmark = 168, Switzerland = 155, England and Wales = 146, Sweden = 128, Germany = 127, Czechoslovakia = 117, France = 105. Hungary is 102, but all the other countries of southern, south-eastern and eastern Europe are below 100. Much the same result is obtained if one uses average percentage of departure from normal yields, i.e. reliability of the harvest. Huntingdon used the seven years 1927–33 and found England and Wales with the greatest reliability, followed closely by Germany and Belgium. Least reliable are the Balkan lands, the Mediterranean countries, eastern and northern Europe. These particular studies have their special lesson for Britain—that the natural advantages for agriculture possessed by eastern and south-eastern England are not surpassed by any continental country. Another measure of the intensity of farming is average income per man in agriculture—which gives much the same result. In 1929 it was highest in Belgium and Denmark, with Britain, Holland and Germany next.

Turning now to more local considerations it was Jonasson also who claimed to be able to distinguish seven ' zones of production ' round each large urban centre.

I. Horticulture.
  Zone 1. Greenhouses and floriculture.
  Zone 2. Market gardening—fruit and vegetables.

II. Intensive Agriculture with Intensive Dairying.
  Zone 3. Dairy products, fat cattle and sheep, forage crops.
  Zone 4. General farming—grain, hay, livestock.

III. Extensive Agriculture.
  Zone 5. Bread cereals.

IV. Extensive Pasture.
  Zone 6. Rearing of cattle, horses and sheep.

V. Forest Culture.
  Zone 7. Peripheral areas, forests.

In any given case it may be rare to find all seven zones and there is overlapping of the ' spheres of interest ' of great urban agglomerations, but this scheme does serve to illustrate the overriding influence of proximity to markets. The general arrangement can be traced in Britain.

The Balance of Agricultural Production.—The general pre-war position as regards grain is well known in that only the countries of south-eastern Europe—Hungary, Rumania, Yugoslavia and Bulgaria—had a surplus of grain for export. It is not always realised, however, that more than half the total consumption of grain had to be imported in Switzerland, Holland, Britain, Norway, Belgium and Denmark, and that in the two first-named it was something like three-quarters. This means, of course, that the specialised agricultural production of dairy produce from Denmark and Holland was based essentially on an import of cheap grain.

Summary and Conclusions.—This very brief sketch should serve to emphasise the need for a careful and precise investigation into the physical factors which control the possible areas of production of all agricultural commodities in Europe and the delimitation of agricultural regions, each of which will have its own problems more or less independently of political boundaries.

There are some areas where grain production is impossible and where the rehabilitation of agriculture must depend on the import of the bulk of the needs. Into this category come Norway and Finland and to a considerable extent Sweden and Denmark.

There are other areas primarily suited to grain production, but where, in pre-war years for reasons sometimes of climate but often of inadequacy of social, economic and technical organisation, the intensity of agricultural production remained low. The countries of south-eastern Europe fall into this category, also Poland.

There are other areas where the pre-war character of agricultural production bore little relationship to inherent natural advantages and was the result of definite government policy. The supreme example is Denmark, but the statement is to a considerable extent true of Belgium and Holland. There are here two considerations: (*a*) how far specialised types of agriculture (e.g. dairying and bacon production based essentially on imported feeding stuffs) can or should be built up elsewhere as a measure of social and economic reconstruction, and (*b*) how far the rehabilitation of agriculture in the countries named will follow new lines rather than the old (e.g. the resuscitation or otherwise of the Danish bacon industry for the British market).

In any case a comprehensive survey along the lines suggested seems an essential prelude to any plans for reconstruction.

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Post-War Tasks for Farmers' Co-operatives

In these days of the rationalisation of enterprise, scientific organisation of work and mechanisation of farm labour, the disadvantages of small farms as opposed to large ones are greater than ever before. The small farmer cannot have specialised machinery of his own as the large farmer has, and even if he had, it would not be so profitable, because he could not make so much use of it. I mention machinery merely as an example. It is the same with all kinds of improvements and aids to production ; there is the question of easier access to good purchasing centres and markets, of quicker and easier information, etc.

The disadvantages of the small farm make it so hard for the farmer to make a living that many

people reject it altogether and propose to replace it by large farms, either collective or individual.

There are, however, a great many things to be said for the small farm. And when I say a small farm I do not mean a minute smallholding, but a farm of the acreage which in the various countries is considered the ideal size for an agricultural unit. It is farms like these which give work to the largest number of independent people. The sturdy yeoman farmer represents the safe foundation of every human society. This has been recognised alike by capitalists and Bolshevists, Italian fascists and German national socialists, though in a different form by each.

The advantages of this type of farm will certainly not be forgotten after the war. There will be more small farms and more small farmers. The disadvantages of this state of affairs can be averted by the form of economic association called farmers' co-operatives. This will place the advantages of the big farmer at the disposal of the small ones, and make it easier for them to pay their way. This system makes rationalisation possible for them. It is a special form of socialisation that does not kill individual initiative but, on the contrary, supports it. It is a special form of collectivism that does not destroy the individual's right to dispose of his private property, but preserves it. It is rightly called the modern economic religion of the countryside.

It is certainly unnecessary for me to champion the cause of farmers' co-operatives when it has proved its excellence with practical and many-sided success in the agricultural life of many countries. A Danish village, where the population consists of medium farmers who are members of the most widely varying co-operative societies, concerned with finance, marketing or production, but all closely bound up with farming, or a Czech village in which the whole of economic life was carried on upon a co-operative basis, was an eloquent proof of this. Compare the condition of the agricultural countries in which the co-operative system was respected with those where it was neglected and you will become firmly convinced that there can be no prosperous small-scale farming nor contented farming population without these farming co-operatives.

I understand by this type of body a society whose purpose is not financial gain and its distribution according to the quantity of capital invested, but the support of the business of its members. The real co-operation of the members to this end in the undertaking concerned is to me the most important sign distinguishing co-operative from capitalist undertaking. The member—a man—and his collaboration, not money—capital—and its consequences, are the fundamental conditions of co-operative enterprise. In my view an enterprise based on the law of co-operatives but not run on the principle which I have just mentioned is much less co-operative than an enterprise existing in capitalistic form but run on that principle. A sugar factory in the form of a capitalistic share company which only accepts shareholders who bind themselves to supply a definite quantity of beets for each share, is to my mind more co-operative than a business with a co-operative constitution which does business with non-members and divides the profits according to the number of shares invested in it.

Of course I do not mean by this that the legal form of a co-operative undertaking is completely negligible. On the contrary I wish to emphasise that one of the first things which we must demand after the war is that all governments should as soon as possible introduce laws laying down a special legal form for co-operative enterprises and should furnish them legally with all the conditions which this form demands for its prosperity. Even in the countries where special co-operative legislation existed already, it will have to be adapted to and furnished with all the conditions demanded by modern times.

Co-operative legislation will, of course, differ in different states. There is no need for world or even for continental unification. On the contrary, each country must adapt its co-operative legislation as far as possible to its national character.

Starting a co-operative movement, educating the farming population, is not easy. The farmer is an individualist through and through and is very often disinclined to join in with someone else. In economic matters especially, he is inclined to rely on his own judgment. The relative self-sufficiency of his work often makes him unadaptable, especially where the land is handed down from father to son for generations as it is in Central and South-Eastern Europe. In these parts the farmer does not regard the soil merely as a means of livelihood, but has a mystic relationship with it. The most important thing for him is not to get the best return he can from it, but to hand it on to his children in as good condition as he received it from his ancestors. He is not running a farming business, like the farmer in Western Europe, who has more commercial training—and consequently a different mentality.

Thus we cannot expect that farmers' co-operatives in Central and South-Eastern Europe will be carried out by the efforts of the farmers themselves as has been done in Germany, Switzerland, Denmark, Holland and elsewhere. The State itself may have to foster the development of farmers' co-operatives in some suitable way. It may sometimes be necessary for farmers to be compelled to adopt co-operation. I am convinced that the benefits of enforced co-operation, even if they do not at first bring the same moral advantages as spontaneous co-operation, would still be the most rapid means for the preservation of the small farmer, since it would render possible the formation of co-operatives upon a basis of sufficient membership and thus ensure their prosperity.

The aim of farmers' co-operatives after the war will be to raise the output of the small farmer and to make his work more profitable financially. It will achieve this through financial, marketing and production societies.

The aim of the co-operative savings and loan societies is to provide their farmer members with cheap short-term capital for carrying on their business, and to encourage thrift. These institutions form the basis of agricultural solidarity and are thus rightly regarded as the foundation of agricultural co-operative activity. Many of them, like the famous Reifeisen system, build upon the joint unlimited liability of all the members,

have, beside their economic importance, an immense moral significance. Our experience in Czechoslovakia, which is the same as that in Germany and Switzerland, rightly regards this form as the cradle of co-operative farming. I consider agricultural co-operative savings and loan societies absolutely necessary and fundamental to co-operative enterprise. These institutions educate the farmers through mutual guarantee to greater solidarity among themselves, which is an essential condition for any co-operative enterprise. Their pioneer slogan, 'the farmer's money belongs in the farmer's bank,' when put into practice, makes it possible for agriculture to occupy the position of increased influence to which it is entitled. Only thus can agriculture achieve equal importance with industry.

The commercial forms of co-operative farming activity are those which are primarily occupied with the joint purchase of farming necessaries such as artificial manures, seed, fodder, machinery, coal, sacking, etc., and especially with markets for agricultural produce, both animal and vegetable. They sprang up as institutions for mutual assistance against the exploitation and extortion of private business by which the farmers were victimised. This was especially the case in Central and South-Eastern Europe. The co-operative supply societies were founded to furnish the farmer with decent goods, by which I mean good weight and good quality at a fair price. They taught the farmer to buy well, to buy the thing he really needed and not what the salesman offered in the most alluring terms, or what he wanted to get rid of. In countries where the farmers' co-operative supply societies grew strong and powerful in the course of years, they extended their activities to cover the actual manufacture of agricultural requisites, such as artificial manure, fodder, machinery, wheel grease, etc. It is certainly open to doubt whether these societies should be allowed to expand to this extent and include in their activities departments which do not really belong to them. Fixing the limit of activities in this respect is one of the tasks awaiting us in the future.

The co-operative supply societies are concerned with finding a joint market for agricultural produce. They look for the sources of demand and try to secure decent prices for the farmer. They concentrate supplies in their own hands and thus have a direct influence upon fixing prices. They struggle against speculation and aim at stability of prices. The centralised marketing co-operatives, spreading over considerable parts of Czechoslovakia, Poland, Bulgaria and elsewhere, showed what useful work mutual assistance in co-operative societies could accomplish in this sphere also. And I must mention here the importance of co-operative training in the standardisation of agricultural and dairy produce, especially grain, meat, fruit, eggs, etc.

Of course I am perfectly aware that the efforts of the co-operative societies, even when they were centralised and receiving support from the State as they did in the Czechoslovak Republic, did not suffice to make farming self-supporting. Successful national planning in the agricultural market, however, is hard to imagine without co-operative societies. I myself have had some experience in this matter in Czechoslovakia, where there was planned economy for all cereals and fodder from 1934 onwards. The results were successful, and their success was due to the plans being based primarily upon the highly developed co-operative system which had on an average more than 60 per cent. of the corn trade in its own hands.

The traders may object that under this planned system in the fixing of purchase and sale price and of the amount of profit the function of the co-operatives and of private trade are really identical. This is so, but only against the will and the tendency of the traders. In my opinion, the traders lose their *raison d'être* in the planned economy of a certain article, because the profit here is without risk.

The agricultural co-operative production societies have a very wide field of action ; it is they that work up the various agricultural raw materials into certain half-finished or finished commodities. The raw materials handled are mainly those which deteriorate rapidly or those of which the by-products are used in agriculture ; for instance, the turning of potatoes into alcohol or starch, of chicory into a dried semi-finished commodity, the canning and drying of fruit and vegetables, the milling of flour, the turning of milk into butter, cheese, cream cheese, etc. These various co-operative enterprises must be adapted to the raw material with which they have to deal, and which all their members are bound to contribute. In this department of activity certain limits should be laid down for the co-operative undertakings in relation to the consumers' co-operative movement, to the rest of the population of the state, and to the character of their work and of the manufacturing process. As agricultural producers they have the right to send certain of their products to market in the form of half-finished or finished commodities, and as consumers they have the right that certain finished or half-finished commodities consumed by them should be handled in the co-operative undertakings belonging to them. Thus an agreement must be reached between the two regarding the division of their activities. Up to now the two branches of the co-operative movement have been rivals, to their mutual disadvantage. Co-operative undertakings for the purpose of working up agricultural raw materials are further limited by the complicated nature of the mechanical or scientific processes and the amount of capital required for manufacture.

I think I must also exclude from the sphere of co-operative enterprise every kind of manufacturing activity which requires special personal ability or would reduce unnecessarily the number of independent producers in human society. As the co-operative system seeks to protect the farmer as an independent man, it must not interfere or cause dislocation in the sphere of enterprise of the rest of production.

In the distributive process there is no need to limit co-operative activity, while in production there must be more of this limitation than there used to be in the countries where the co-operative manufacturing enterprises had developed extensively.

If co-operative farming as represented by any of the above-mentioned activities, that is banks and loan societies, supply societies or production

societies, is to be properly carried on it must not be run in an amateurish manner. It must be strictly administered by experts and the work must be organised on scientific lines as it is in other undertakings. There has been a lot of amateurish work in the organisation of co-operative undertakings formed and run by the farmers for themselves, and in this they have differed greatly from capitalist undertakings. This must be prevented in future by seeing that the direction of even the smallest co-operative undertaking is controlled from a co-operative centre. It is only by setting up these co-operative centres that the small co-operative undertakings can be made to function properly. These centres will be places where there are experts for every kind of work who keep an eye on all the units subordinate to them. Organisation into a society or union is one of the conditions of success and prosperity for any co-operative activity. I regard it as such a fundamental condition that without it I cannot imagine the rise of a co-operative system to-day in any place where it did not exist before. A further important condition for successful development of the co-operative movement is the greatest possible centralisation within the various states. Rival co-operative movements striving against one another within the state are a warning example. This is specially true of the relations between industrial workers and agricultural co-operative societies in those countries where both these branches of the co-operative movement are equally developed. Very often instead of mutually strengthening each other by co-operation they have devoted much money, time and labour to conflict which has weakened and injured the co-operative movement as a whole.

Farmers' co-operatives, like every other enterprise, must be run in such a way as to be self-supporting and must not rely upon permanent subsidies from the Government or contributions from any other source to keep it going. This of course does not mean that in those countries where the co-operative movement is very weak or does not exist at all, and has to be built up, it should not be helped by Government subsidies for the first few years. But even here it must aim at ultimate self-support and financial independence. The co-operative movement in different countries has clearly proved that this condition can easily be fulfilled.

Farmers' co-operatives in the different countries will have to be built up to correspond to national needs and fit in with the national character. This does not rule out the possibility of an international co-operative farming organisation which would link together and be able to correct and advise the national organisations. Something of this sort was already becoming desirable before the war, but after the war it will be essential. It is possible to form it on the basis of existing international organisations. It might be incorporated in the international economic organisation which will be set up as part of the next League of Nations, and furnished with certain executive powers.

We do not know to-day how agriculture will be organised after the war in the different states. But we believe that in most countries, if not all, the need will be seen for the existence of small independent farms. They will be able to prosper better than before if the farmers unite in co-operative societies for financial, supply and production purposes. Thus co-operative farming will contribute effectually to the creation of the better world of the future.

Dr. Juraj Krnjević
(Vice-Premier, Yugoslav Government)

Peasant Education

I AM neither a professor nor a teacher. So I cannot speak on peasant education as an expert in matters of education. But ever since 1919 I have been very active in the Croatian Peasant Movement, as a member of Parliament and, for twenty years, as the General Secretary of the Peasant Party. During this time, I have collaborated closely in all its political, cultural and economic activities and observed the results. The Croatian Peasant Movement, in its ideology and its methods, differs considerably from similar movements in other countries. The results obtained show that its methods and principles corresponded entirely to the national needs and conditions.

The whole activity of the Croatian Peasant Movement was based on cultural activity, and its results in the economic and political spheres are the consequence of this work. That is why I have thought of answering the invitation to speak to the Conference on European Agriculture, by giving some information on the cultural work of the Croatian Peasant Movement. In my opinion, this may be of general importance, because the general principles on which the cultural activity of the Croatian Peasant Movement is based can, and I think should, be applied also among other peasant peoples who are fighting for the improvement of their social conditions, political influence and economic prosperity.

At the beginning of this century, the social structure of the Croat nation was as follows: 82 per cent. of the entire people were peasants living in villages on small holdings. The remaining 18 per cent. were intellectuals, tradesmen, manufacturers, craftsmen and workers. In their way of life, the craftsmen in the villages and small towns did not differ essentially from the peasants. In addition to their profession, every one of them owned some land and cultivated it. Of the workers, only a very small percentage could be called proletarians as the term is understood in industrial countries. There were very few skilled workers. The greater majority went to work in factories either as seasonal workers during winter, when there is no work to be done on the land, or for several days in the week, their permanent abode still being the village, where they went on cultivating their holdings. Their aim in doing factory work was not to become industrial workers, but to improve their holdings with the help of their earnings from the factory. Counting, in addition to the peasants, all those craftsmen and workers who, by virtue of their way of life, must be considered as peasants rather than as small bourgeois or industrial workers, we find that, at the beginning of the twentieth century, about nine-tenths of the Croat people were peasants.

What was the situation of these peasants? From the social point of view they were considered to be the lowest class of the nation. In

the domain of politics they had no influence. Economically speaking, although they were the basis of the entire national economy, they were exploited by everybody and had an incredibly low standard of life. The great difficulty was that the peasants themselves were convinced that this state of affairs could not be appreciably altered, although they certainly felt it to be unjust. To-day, forty years later, we have a totally different situation : the Croatian Peasant Movement with its political, economic and cultural organisations is by far the strongest force among the Croat people. The Croat Peasant Party, the political representative of the Croat peasant people, has been in possession of the majority of the Croat parliamentary seats since 1920. Already at the 1927 elections, this majority comprised about 80 per cent. of all Croat representatives and, in the 1935 and 1938 elections, there were no other Croat candidates in the Croat constituencies. To-day, it is universally recognised, both among the Croat people and elsewhere, that the Croatian Peasant Party is not only one of the existing political organisations of the Croat people, but *the* political organisation. Still more important is the fact that these political results were reached by democratic action and at a time when the Croatian Peasant Party was in opposition and was engaged in a struggle against dictatorial and brutal régimes.

Through its political success, the Croat peasantry has also brought about a far-reaching social revolution within the Croat nation, the greatest yet achieved in the course of its history. From being the last factor in the national life, it has become the most important factor. Elsewhere in Europe, it is the workers who are the main spokesmen in the struggle for social justice. The peasants are accepted within their ranks as younger and weaker brothers, or because there are a number of agricultural workers among them. In Croatia, the situation was exactly reversed, owing to the strength of the Croatian Peasant Party. The Croatian Peasant Movement included a Croatian Workers' Association, a professional organisation to which the great majority of the Croatian workers belonged. Owing to the fact that only a small percentage of the people are employed in industry, the working-class people have felt that they have not been strong enough to carry on the struggle for their rights against the employers by themselves. Accordingly, the workers have been glad to join a movement comprising the overwhelming majority of the nation and prepared to support them, thus enabling them to secure what they would not have been able to achieve by themselves.

What enabled the Croat peasantry to bring about such a far-reaching, peaceful revolution within twenty-five years ? It was the consequence of the life-work of the brothers Antun and Stjepan Radić, the founders of the Croatian Peasant Movement. The brothers Radić were the sons of a peasant. They were deeply impressed by the injustice perpetrated on the Croat peasant people and decided to consecrate their lives to the breakdown of this injustice. They had the necessary moral and intellectual capacities enabling them to organise this gigantic struggle, being not only greatly gifted and highly educated, but also men of an undaunted courage and unflinching purpose. At the very beginning of their work, they realised that the interests of the entire Croat peasantry lay, firstly, in raising its social position ; secondly, in becoming a political factor ; and thirdly, in improving its economic position. They also grasped the fact that nobody would do this for the peasantry, but that the peasants must achieve it by themselves. They further realised that, in order to carry out this great work, the peasants must be united in a single organisation, and thus, as a national majority, obtain the position due to their numbers, their economic importance and, above all, the village's importance in the whole national life. In order to enable the peasants to carry out this struggle successfully, it was necessary to strengthen in them the faith in the victory of justice which every peasant carries in the depth of his soul and to create the faith in themselves and in the irresistible force of the united organisation of the entire peasantry.

When the brothers Radić began their work, the franchise was limited. Perhaps every hundredth peasant was an elector. The Radićs came to the villages not as electioneering agents, but as prophets of a better order, convoking to their meetings the whole village population, teaching them the creed of social justice and telling them that this aim could not be achieved unless the peasants fought for it themselves within an organisation comprising the whole Croat peasantry.

The entire organisation of the social order, from the highest state administration, had been based on social injustice and on the exploitation of the peasant. The upholders of this order naturally opposed every attempt to effect a change. The struggle was carried on by unequal adversaries ; the only chance of victory for the peasantry depended on its consciousness, unity and steadfastness. The movement first spread in some areas of Northern Croatia. Anyone who has worked in Labour organisations knows how difficult it is to group millions of people in one single organisation. Such work presents special difficulties in peasant countries such as Croatia, where the reactionary social forces opposing it were very powerful and had a great interest in preventing peasant unity. In the face of all these obstacles, the brothers Radić succeeded. They found hundreds, and later thousands, of apostles among the peasants. These collaborators spread the Radić doctrine first in their own villages and then in their communes and districts. Later, they brought the gospel of the Peasant Movement from Upper Croatia to Bosnia, Herzegovina, and Dalmatia. Their mere appearance, the idealism, and, above all, the great faith of these apostles in the ultimate victory of justice against injustice broke down every barrier.

Thus the foundations of the Croatian Peasant Movement were laid exclusively by cultural activities. The aim of this activity was not to help the individual to rise. Its aim was to awaken millions of people and to achieve this not by the agency of professional politicians or teachers, but through the activity of the people themselves. Once the people became conscious of the necessity of united manifestation in the political field, it

was easy to work for united action of the peasant in the economic domain also, and to lay the foundations of peasant economic organisation. In this respect, the summit was reached by the founding of the ' Gospodarska Sloga ' (Economic Unity) which controls all peasant co-operatives and has a branch in every village.

In addition to all its great achievements in the political and economic domains, the Croatian Peasant Movement has not neglected to carry on its cultural activity. The only difference between the first cultural activities and the work of to-day lies in the fact of the latter being more systematic. The cultural organisation of the Peasant Movement is the ' Seljačka Sloga ' (Peasant Unity). It has thousands of branches. These branches are led exclusively by peasants—men and women. The whole village takes part in the work of the village branch. The aim is to effect the collaboration of all and the advance of all instead of that of a few individuals or of an élite. The main part of the work is done in winter. In summer, when farming work takes up most of the peasants' time, cultural work is naturally limited. In order to enable the whole village to take part in cultural meetings, the villages are divided into smaller units, so that up to ten meetings, comprising about twenty persons each, can be held in one village at the same time. One of those present either reads out something or delivers a speech. The others listen and a discussion follows. The number of those present is limited so that all can take an active part in the work of the meeting. This is only one aspect of the organisation's activity, the results of which have proved very satisfactory. A very great task has been accomplished by the cultural organisation of the Croatian Peasant Movement in areas containing illiterate populations. The teaching of reading and writing of illiterate adults is also based on the principle that one peasant must teach another.

It would be an exaggeration to assert that the Croatian peasants have learned everything they should know for public and private life in this way. They have not done so and they could not do so. But they have learned the main lesson : they have become conscious of their own forces and of the fact that they can only improve their social position and become masters of their fate by their own untiring cultural activity and by their unity. As to other vital questions, their interest has been awakened. To-day the peasants study different problems of life in thousands of branches of the Seljačka Sloga. They take a most active part in every domain of public life and have a definite point of view with regard to every actual question. I particularly wish to add that this cultural activity has also given an impulse to hundreds of thousands of peasants to study such special branches of learning as co-operative organisation, modern methods of land cultivation, communal administration and self-government, etc. The Croat peasants have proved to be first-class leaders of co-operatives, communal councillors and M.P.'s as well as cultural workers.

This is the result of the cultural work whose foundations were laid by the Radić brothers and which is still progressing with increasing success. It has always persevered in the main principles, namely, that the peasants are the natural bearers of the cultural activity in the villages, and that this activity must embrace not only individuals or chosen groups but the entire peasant people. That does not mean that the expert knowledge has been ignored. On the contrary, the collaboration of the intelligentsia has been highly appreciated and proved very successful.

Dr. John Hammond, F.R.S.

Artificial Insemination

As a basis for economical production the use of seed from well-bred strains of crops is well recognised everywhere. With animals the same thing holds to an even higher degree because of the higher value of the product. In the past, however, because of the expense involved, it has been found most difficult in practice to ensure that the smaller farmers, who outnumber the larger farmers in most countries, can obtain well-bred animals for commercial exploitation. By using the modern methods of artificial insemination, however, all this can now be changed, and the very best strains of livestock can be put at the disposal of the small farmers with little cost.

The modern methods of artificial insemination have been developed by scientists mainly in U.S.S.R., in this country, and lately in U.S.A. The process is a relatively simple one. The semen is collected in an artificial vagina, a cylinder with a jacket of warm water. When the male jumps the female the penis is guided into the artificial vagina and the semen is collected in a glass vessel attached to the end of the artificial vagina. It is not necessary to have a female ' on heat ' for this purpose, for the male may be ' conditioned ' to serve a dummy. However, for use on farms it has been found most convenient to use a quiet female confined in a service crate. In this way the full ejaculation is collected in as uncontaminated a state as is possible. There are other special ways in which the semen can be collected if circumstances require it. For example, in bulls in which the desire to mate, or power to jump has been lost through leg injury, the semen may be obtained by massage of the vas deferens with the hand per rectum. Again, when no ewe is readily available, ejaculation can be caused in rams by passing an electric current through the spinal cord at the level of the fourth lumbar vertebrae from one pole in the rectum and the other on the back.

To inseminate the female the semen is sucked up into a syringe and is injected into the cervix of the female, using a vaginal speculum. In the case of the larger animals such as the cow or mare it is probably best, however, to dispense with instruments and insert the semen, enclosed in a gelatine capsule, into the cervix with the hand. Needless to say the insemination must be done when the female is on heat, although with cows, where the egg is shed some 12 hours after heat is over, successful insemination can be made for about 8 hours after heat is over. Since under natural conditions in cattle and sheep the semen is deposited in the upper vagina and only a small part of it finds its way through the cervix into the uterus, it is possible artificially to inseminate

many females from one ejaculate, for in artificial insemination the semen is inserted directly into the cervix and none is wasted in the vagina. The actual number of females that can be successfully inseminated varies greatly with the species, being about 30 to 40 with sheep, 10 to 15 with cows, 8 to 12 with horses and only 2 with pigs. Since in rams the volume of the ejaculate is only about 1 c.c. special means have to be taken to distribute it among 30 or more ewes. Special isotonic diluting fluids are used, but it has been found advisable not to dilute the semen by more than a third with these fluids. A special inseminator with a micrometer screw piston, which will deliver a small drop only into the cervix, is also used. By such means it has been found possible to inseminate very large numbers of females from one male. For example, in 1938 in U.S.S.R. 1,536 cows were inseminated from one bull and produced 1,490 calves, and 15,016 ewes were inseminated from one ram and produced 15,662 lambs.

By these means it is possible at small expense greatly to extend the use of well-bred males and to raise the standard of the livestock quickly. It is especially of great importance for dairy cattle, for the true genetic worth of a dairy bull is not known until his daughters come into milk when he is at least five years old. Under present conditions the use of a bull which has proved its value in this way is limited to one herd where he will produce only about 30 to 40 calves a year. By using artificial insemination, however, his progeny can be widely spread over the country and by producing a thousand or more calves in a year he will quickly and materially increase the efficiency of the dairy industry of the whole district in which he is kept. This will apply with particular force to those areas where the farms are small and the owners under present conditions cannot afford to keep a good bull.

Another great benefit that artificial insemination can confer is that of spreading the best genetic stocks of cattle and sheep widely throughout the world at very small expense as compared with the present system of conveying breeding animals by sea and rail. The present great expense of transport prevents the great majority of small breeders from obtaining animals of the most efficient breeds of livestock.

The methods necessary for keeping the sperm alive and capable of fertilisation for long periods of time outside the body have been the subject of much scientific research in recent years, and considerable progress has been made. In the body of the male the sperms are known to retain their power of fertilisation for about 40 days, but so far, outside the body they can only be kept fertile with any degree of certainty for about 5 days in the sheep, 3 days in cattle, and under 1 day in the horse and pig.

In the epididymis of the male the sperms are immotile, but when mixed with the secretions of the accessory glands during ejaculation they become actively motile. The problem of storage is to keep them immotile so that they do not use up their reserve of energy. By cooling the sperms to 40° F. their motility is reduced and they remain fertile longer than at high temperatures. If the temperature is reduced still lower, however, the fertilisation appears to be injured, although their life persists. It has been found that slow cooling from body temperature to 40° F. is preferable to fast cooling. The motility of the sperm is also reduced by a high carbon-dioxide tension in the fluid, such as exists in the epididymis of the male. When the semen is to be kept for long periods, therefore, it is kept under a layer of liquid paraffin so that the carbon dioxide in the semen is retained. In packing the semen for long-distance transport it is placed in small glass tubes and covered with liquid paraffin; these tubes are placed in a thermos flask at 40° F. In this way ram sperm has been sent successfully from Cambridge to Warsaw, and bull sperm exchanged between England and Holland. With fast air transport it should be possible by these methods to spread the best lines of livestock cheaply throughout the world after the war.

There are many other uses for artificial insemination, such as for preventing the spread of diseases such as abortion and trichomonas in cattle, and for the crossing of species and breeds which differ in size, but time does not permit of their discussion in detail.

PROBLEMS OF PEASANT FARMING

SATURDAY, MARCH 21: AFTERNOON SESSION

SIR E. JOHN RUSSELL, F.R.S., IN THE CHAIR.

Dr. C. C. L. Eygenraam (Netherlands Government)

Farming in a Densely Populated Country

AMONG the various factors which will have to be considered in any post-war reconstruction of agriculture, a fundamental one is the relation of labour to available land.

In a densely populated district agriculture has a different character and is confronted with problems entirely different from those existing in thinly populated countries. It no longer holds true that the most fertile and most promising areas are at the same time the most densely populated ones. Such a condition could only exist if there were freedom of migration, and in this respect the pre-war world has shown most hampering restrictions. An effectual reconstruction of European agriculture could therefore be much facilitated by a well-planned migration and colonisation both within and between the different continents. But such a reconstruction would require mutual understanding, time and prepara-

tion. When such understanding is not present in all stages of this work we get forced migration of the kind the Nazis are now effecting in the oppressed countries of Europe. And as long as there is no definite outlook in this respect the agricultural questions in Europe will be complicated by their overpopulated rural districts.

Now let us consider what special problems agriculture in such densely populated districts has to face and in what respects there is still room for improvement.

I should like to survey these problems on the basis of conditions in the Netherlands, not only because I am best acquainted with those conditions, but also because it would be difficult to find another country in Europe with a higher average density of rural population which has so strongly influenced the technical side of agriculture. In the Netherlands roughly 12 workers are engaged wholly or in part on every 100 acres of cultivated land. Only Belgium gives a still higher figure, viz. 13, but this figure is to some extent inflated because of the fact that the proportion of part-time to whole-time workers in Belgium is higher than in Holland.

Quite different are conditions in this respect in other countries, i.e. the former Baltic States with 7, Denmark with only 6 workers per 100 acres, Great Britain or France with hardly 3, whereas in New Zealand even far less than 1 person is engaged on every 100 acres of cultivated land.

In Holland small-scale farming is the rule. Leaving market gardeners and those who are only partly engaged in agriculture aside, there are two quite different types of farming to be distinguished.

(1) The small to medium size of family farming which covers nearly 80 per cent. of the total area under cultivation.

(2) The very small so-called dwarf-holdings under 12½ acres in size—more peasant-household farming than commercial farming enterprises.

This group of dwarf-holdings occupies less than 10 per cent. of the cultivated soil, but gives, is at least supposed to give, a living to 25 per cent. of the farmers' population of the country. To earn a family's income from merely 10 acres of land—often rather poor land—could only be achieved by a remarkably high output per acre, which was obtained before the war by using the land for fodder crops, specialising in livestock keeping and buying supplementary feeding stuff and fertilisers from elsewhere. For concentrates and fertilisers for instance—the main elements concerned—accountancy statistics for this type of farm often show figures at least twice as high per acre as the larger farms used to spend.

Such a great dependence on bought-in supplies is indeed a weak spot in this type of farming, but it is only partly due to the small size of the holding. As it has been proved by an investigation some years ago, better crop management, viz. the cultivation of more roots and maize which improve the crop rotation as well, could procure the farmer with more of its home-grown fodder, making him less dependent on foreign supply.

In technical skill the small peasant farmer is still far behind. The great problem to get things improved in this respect is therefore to advise him in such a way that even to his low standard of education it is of practical value. Co-operatives can do and have done excellent work. It is remarkable how, for instance, payment by fat percentage, or milk production control by co-operative dairies has favourably influenced farm management, and how even among the very small farmholders technical knowledge about seeds, fertilisers and livestock-keeping has progressed most successfully in recent years. But the co-operatives who confine their attention to the marketing side of the farmer's business cannot be expected to influence also the cropping plan of the farmer. Since 1935 the Government has paid much attention to this technical problem of better farming among smallholders and started to convert 100 of these dwarf holdings into sample farms; 100 agricultural advisers especially adapted for this task were to assist these farmers in their sowing plan as well as in the improvement of the soil. Farmers, smallholders, whose weekly income was below a certain minimum could join the scheme. The Government paid the difference between this fixed minimum and the actual weekly income, not, however, in money, but in goods, for the improvement of the farm, and only under the condition that the farmer was willing to run his business according to the technical instructions of the agricultural adviser. The first experiences were hopeful, but the scheme has been in operation too short a time to allow definite conclusions to be made.

There is another handicap to better farming: the great 'parcellement' of the soil, especially among smallholders. Only regrouping of the holdings can alter this. Until recently practically nothing had been done in the Netherlands in this respect. A new Act of 1938, however, has facilitated the conditions under which regrouping can be executed, and by taking advantage of cheap, otherwise unemployed, labour the costs have been reduced.

In 1937 only a few thousand acres of land were regrouped in this way. In 1942, however, more than 300,000 acres are going to be regrouped. If we go on in this way for another four or five years the cultivated soil in the Netherlands will be freed from this evil of 'parcellement.' Besides there is now a growing tendency to put regrouping schemes, which were originally of a mere communal character, together so that regional planning gets possible, and in that way in many regions the drainage can be improved at the same time.

The years before this war are proof that even the small farms of 8 to 12 acres are fully justified. It is true that the choice of crops was limited in most cases to livestock products in mixed farming, all the same a fair margin could be reached in an amelioration of farming methods and a more intensive exploitation of the soil.

When, however, prices of these crops collapsed, and as a consequence it was decided to restrict production, this restriction proved fatal to the farmers concerned. These units of production were far too small to permit a reduction in livestock. They were also too small to be switched over to arable farming. So vulnerable was their existence that lack of imported fodder or the impossibility of selling their livestock products would necessarily doom them to ruin. This would mean the ruin of 25 per cent. of the Dutch farming

population. This remained an unsolved problem when war broke out.

The trend of agriculture under the German occupation has only emphasised the difficulties facing this class of our farmers. Each country under German control is now ordered to attain some sort of self-sufficiency which for Europe as a whole and for most European countries separately is only possible to a certain degree with respect to starchy food. For densely populated countries like Holland where the soil is already employed to the full, this means a structural change in agriculture. For in those countries the necessary increase in crops for direct human consumption can only be obtained at the cost of fodder crops and subsequently at the expense of protective food of animal origin. From the farmer's point of view such extensification of agriculture necessarily means loss of the additional income which formerly could be derived from transforming mere vegetable crops into animal produce. For the very small farmer, on his dwarf-holding, however, it means worse than the loss of additional revenue ; it undermines the very basis of his existence. By slaughtering his poultry, pigs, and to a certain extent also his cows, he has to earn his living from the sale of potatoes or rye. In this way tens of thousands of smallholders are condemned to pauperism. Perhaps they will be able to grow enough for themselves with their crops, but they have not enough to sell in order to meet their financial obligations. Probably they are now put to work on the schemes of the agricultural land regrouping, as at present in operation, or are being sent to Germany for agricultural work, but this of course does not give a solution for the pressing population problem after the war. Therefore it will be necessary and effective to give back to them the very basis of their existence, their pigs and cows and poultry stock as rapidly as possible. This is not only a matter of food for the population as a whole, but here is also at stake the important question of employment for the rural population.

So much for the very small peasant farming. Now let us turn to the other group, the small to medium family farming, a peasant class which forms the backbone of agriculture in the Netherlands. This class also feels the brunt of the rural overpopulation. As an average for the country as a whole, this group has not less than 9 full-time workers per 100 acres of land engaged. The actual figures according to type of farming are as follows : 6 on pure grassland, 8 on arable farming, and 11 on mixed farming.

Whereas other countries have motorised and mechanised their farming in the last 20 years, Dutch agriculture has not followed this development. Some people are inclined to think this is due to lack of capital invested in the relatively small units of which practically the whole agricultural system exists. This was, however, not the case. Existing co-operation could have provided for this if it had really been useful to Dutch agriculture as a whole. It is, however, a fact proved by experience that in densely populated areas mechanisation of agriculture is not needed. One might even go so far as to say that in general in such areas mechanisation would be more harmful than beneficial. Contrary to industry, agrarian production, generally speaking, cannot be raised by mechanisation or motorisation. As a French scientist, Professor Fromont, recently said : ' motorisation and mechanisation do not increase the rate of agricultural production, which still remains excessively slow in comparison with the rate of industrial production. It leaves yields unaltered.'

Arable farming in the Netherlands gives ample proof of this contention. As a result of low prices for their products agriculture in the arable districts proceeded after 1925 to a certain degree of mechanisation. The results of this step were submitted a few years ago to an official enquiry which showed that productive capacity per man had risen 40 per cent., whereas the total output remained unchanged. On the other hand, employment had diminished by 27 per cent. It showed that mechanisation, far from raising total production, tended to aggravate rural employment. This is an advantage to sparsely populated areas. On densely populated land, as the Netherlands, it is decidedly not so ; it tends to make the solution of the problem of population and employment more complicated than it already is.

In these areas more satisfactory results are to be obtained by rationalisation, which offers far greater possibilities. Rationalisation often has the advantage that by applying it, productive capacity as well as employment can be raised. It seems worth while to examine in which direction rapid and more or less spectacular results may be obtained under existing circumstances by way of rationalisation.

One need only mention the following possibilities :

improvement of seed strains,
livestock breeding,
scientific feeding and manuring,
elimination of diseases.

When I mentioned the figures relating to employment per 100 acres in the various farming systems the evident conclusion was that arable and mixed farms employ a far greater number of men than pure grassland farms can employ. We must, however, not lose sight of the fact that further technical improvements in methods of arable farming cannot give spectacular results in the field of employment. At least in the Netherlands, for this simple reason, that one cannot go on indefinitely getting higher results per acre, and as Mr. Yates yesterday has shown, agricultural yields per acre in the Netherlands are already on the top. Also with regard to livestock-breeding, especially the increase of the milk-fat percentage and the production of eggs per hen, the results in recent years are very notorious. But livestock-breeding is a slow process.

More promising prospects seem to exist in grassland cultivation. Recent scientific research in several countries on grassland treatment has made it clear that there are still ample possibilities in this respect.

Firstly.—Improvement of the botanical composition of the sward by seed selection. In this regard the practical farmer is still far behind. Now when so much land has been forcedly

ploughed up post-war reconstruction schemes might offer a good opportunity for improvements of the new sward. Much may be expected in this connection from Great Britain and the United States, where scientists as well as farmers have already achieved so much.

Secondly.—Improvement, by intermittent manuring and spraying, of the chemical composition of the grass during those summer months in which under normal weather conditions it will have deteriorated.

Thirdly.—Rotational methods of grazing and winning of winter fodder by means of silage and grass drying. In other words, the modern grassland technique, which brings much higher yields and absorbs more labour as well.

The ordinary grassland exploitation is a rather wasteful process, both with respect to grazing and haymaking. But by rotational grazing in small plots on the contrary the cow can be rationed and put on a balanced diet also throughout the summer, and not merely as formerly in the winter feeding period. In this way more grass can be put aside for winter fodder. Artificial grass drying instead of haymaking makes it possible to turn the grass into a highly concentrated winter fodder.

Thus modern grassland technique makes grassland farming under European weather conditions more self-sufficient and less dependent on imported feeding stuffs. That means that the value of material formerly imported could be converted into additional income for labour employed on the farm.

Indeed modern grassland farming can be considered as one of the few examples where mechanisation—contrary to the general rule in agriculture—means higher productivity of labour and at the same time larger requirements of man-power. This makes modern grassland exploitation especially acceptable for densely populated countries. If in this way only one man per 100 acres could additionally be employed on grassland farming this would mean for instance for a country like the Netherlands 13,000 farmers' families more provided for.

These are some problems and prospects of small-scale farming in densely populated areas as the Netherlands. How far they will work out and how far technical knowledge can be put into practice after the war will ultimately depend on the future of marketing agricultural products. Therefore we must realise that an effective solution of problems like European small-scale farming can ultimately only be found in a fair and agreed allocation of markets within the framework of international planning and in a spirit of mutual consultation and understanding.

H.E. M. Anders Fjelstad (Norwegian Cabinet Minister)

Some Aspects of the Livestock Problem of the Small Farmer

An overwhelming majority of the world's population is engaged in agriculture. Only 16 per cent. of the population of the world gains a livelihood from non-agricultural activities. A substantial proportion of this enormous agricultural population earns its daily bread on small farms and holdings. The average size of farms varies from country to country, but by and large one can say that it lies somewhere between 5 and 50 acres. Holdings of under 25 acres account in most countries for over 50 per cent. of the farms.

I mention that in order to stress the prominent place the small farms occupy in European agriculture. In the same connection I should like to emphasise that the economic existence of the European farmers is bound up with domestic animal husbandry: cattle breeding, milk and meat production, breeding and production of pigs, poultry and eggs, etc. This small-scale economic structure with its limited technical possibilities makes the European farmer less able to compete with the overseas corn-producing and exporting countries.

A considerable proportion of Europe's livestock is to be found on these small farms, and in this connection I want to examine rather more closely some of the problems which come to the forefront in this type of agriculture.

A large number of livestock per areal unit means a substantial investment of capital in regard to both stabling and outbuildings, but the peasants living on small farms find it difficult to raise the capital which is necessary for the construction of suitable outbuildings. The consequence is inappropriate buildings and clumsy makeshifts, involving a great waste of time. The costs of production are unnecessarily increased. Unsatisfactory outbuildings also affect the health of the livestock.

The hygienic side of milk production has made great progress in recent years, but there is still need for a greater insight into and understanding of the demands which must be placed on so fundamental a food as milk. A milk which satisfies all the modern hygienic demands is of the greatest importance for the nation's health, while at the same time it increases the sale of milk for human consumption and dairy products. That is something which I have experienced in my own country.

Agriculture is an industry which does its work slowly. It takes three to four years to breed a cow. Careful planning is therefore essential. Most measures must be thought of in terms of long-term general improvements. There is also the difficulty of achieving more efficient methods of production because the agricultural industry is run by an enormous number of small-scale producers. In the northern countries a great deal has been achieved in this sphere. In those countries it is quite difficult to find a farmer—large or small—who has not gone through technical training in well-equipped agricultural schools and also on well-conducted model farms.

Success in livestock farming depends mainly on three factors: intelligent breeding for quality, rational production and utilisation of feeding stuffs, and finally effective exploitation of co-operative processing factories and marketing organisations. There is much to be achieved in these fields, not least in the last-mentioned. Experiences from many countries show how the farming population by dint of organisation can obtain important advantages and achieve great progress and, in this way, make a large contribution to the raising of the standard of living

amongst the rural population. Certainly the standard of living depends very much upon the whole circumstances of a country's past history and economic development, but experience shows that through good technical training and modern organisation enormous improvements can be made in a short time in the standard of living of a rural population.

In all west European countries there has been an increase of production, but at the same time there has taken place such a large growth of population that there has been a parallel increase in the import of both food and feeding stuffs. I want to emphasise that no west European country is self-sufficient in feeding stuffs : they all import maize, barley, and oil cake of various sorts and in considerable quantities, but despite all imports it is the production of fodder on the individual farm which must form the main basis for the feeding of livestock. Here too we are faced by problems of far-reaching economic importance for the small farmer. In order to achieve a high milk yield it is necessary to have a rich supply of root crops (and potatoes) associated with the use of prime-quality hay and good pastures. The production of root crops is still very backward in the smaller farms where it is not easily conducted along rational lines.

I will not go further into this question, but I want to emphasise the inadequate methods which are employed in most countries for the conservation of hay. At the same time, too little attention is paid to the composition and quality even of grasslands and pastures. Unscientific methods of conservation result in the loss of from 30 to 50 per cent. of the nutritional values of fresh green-crops. That especially affects the albumen and vitamin contents.

By better methods of harvesting and drying, by the general use of silage, or by the so-called A.I.V. method, or similar methods, together with the artificial drying of grass, it should be possible to obtain far more and more valuable fodder on one's own land. Artificially dried green-fodder composed of the right selection of plants has such a large concentration of albumen that the highest milk yield can be achieved without the addition of purchased concentrates. I know of cases where the use of such fodder—without the addition of concentrates—has brought about an average yield up to 1,000 to 1,200 gallons per year.

In the same connection I want to emphasise how important is good pasturage for milk production and as a source of high quality milk and dairy products, but a rational solution of the pasturage question is difficult for the small farmer in present-day circumstances. It is possible that in order to solve this question we may not be able to avoid a certain regrouping of land.

In my own country the public authorities make considerable contributions towards the laying down of pastures, the installation of irrigation, the building of silos, the installation of drying plant, and so on.

The conservation of natural manure, together with a rational employment of this and of artificial fertilisers, will also increase the yield to a considerable extent. This is a field in which there has been much neglect, particularly on the small farm. If one looks at the more advanced agricultural countries one will see that they are far in advance of the others in respect of both conservation and utilisation. This is true of both solid and liquid manure. In my own country, for many years, public contributions have been made towards the construction of storage places and concrete containers, and information has been disseminated concerning the best utilisation of natural manure. In many places there is incredible wastage in this sphere. Even in such a progressive agricultural country as Great Britain the most elementary rules are neglected in this field. The future of agriculture largely depends on research and the progressive utilisation of manures and fertilisers. Primitive and traditional methods still predominate in this domain.

I should now like to say a few words concerning pig production. By far the largest proportion of Europe's pig population is found on small farms. In countries such as Denmark, Holland and Belgium 70 to 80 per cent. of the pig population is found on farms of under twenty-five acres. This field of production is well adapted to the small farm. But in many countries use has not yet been made of the experiences which science puts at our disposal in respect of breeding and feeding. Through rational breeding and intelligent feeding the Danes can produce a bacon pig in six months, whereas twenty-five years ago seven to eight months were necessary. In the same period the Danes have reduced the food-units consumed per kilogramme increase in weight from 4·0 to 3·4, while the percentage of exportable bacon to liveweight pig has been increased from 57·3 to 60·0. In the same period the length of the body has also increased from 89·3 centimetres to 92·2 centimetres. This shows how by intelligent breeding and intelligent feeding the pig has been made into a far more efficient machine for converting cereals and skimmed milk into meat. Not only does the pig need less food for every pound increase in weight but it puts on weight at a faster speed. In this sphere there is a considerable need for improvement, especially on the small farm. Better sties with more modern equipment will at the same time promote the use of rational methods and achieve cheaper production. But this requires capital which is difficult to obtain without special arrangements made by the public authorities. In my country the State gives considerable subsidies for the building of outhouses on small farms.

This short review would be incomplete if I did not say a few words about the question of driving power, which is a difficult problem for the small farm. In these days when every effort must be made to reduce costs of production and to employ labour-saving methods, we must aim at carrying through an increasing mechanisation of agriculture. Animal driving power is gradually being replaced by motor power, but in this field, too, the small farm is handicapped. Mechanisation involves heavy outlay, nor is it easy to provide tractors and equipment suitable for the small farm. In many countries, however, this question is the subject of intense activity, and in recent years considerable progress has been made. In the same connection I want to mention the electrification of rural districts which contributes

in so many ways to the creation of new life and activity around the farms. In Norway we had gone very far in this direction. There are no longer many places without the electric cables which bring light and power to the whole district. Electric motors are now humming around almost every farm, easing toil and bringing greater comfort. In this way certain aspects of the question of driving power now have to be regarded from a different point of view. It goes without saying that such installations also cannot be carried through without support from the public authorities—but it is money well spent.

Up till now I have dealt with a number of problems of production and technical questions which arise in connection with the animal husbandry of the small farmer. It is, however, not sufficient to produce ; the goods must also be brought to the market and sold at a remunerative price. That was easy enough so long as there were free markets and prices were more or less stable. This situation came, however, to a sudden conclusion when the world economic crisis broke upon us in 1929, and as ' laisser-faire ' ebbed out of economic life during the great crisis of the '30's, one country after another went over, to a greater or lesser extent, to a planned economy.

With the fundamental importance which agriculture has in the economy of each country it is natural that agriculture should be one of the first industries to be planned—and not the least because farming is carried out by such a vast number of unco-ordinated small-scale producers. The question is therefore no longer ' to be or not to be,' but how agricultural production and marketing can be regulated and organised in order to serve best the interests of agriculture without damaging those of other social groups.

In proportion as the gap between industry and agriculture became wider during the crisis of the '30's, the diminishing purchasing power of the agricultural community created incalculable retrogression and unemployment in the other branches of the national economy, but the first to suffer were the interests which were inseparably bound up with Europe's small livestock farmers. Export markets collapsed, and the home markets were not organised.

Whatever economic views were formerly held, it became necessary to go in for drastic measures and methods of organisation far beyond what would earlier have been thought possible.

As early as 1929–30 we in Norway began the organisation of the internal milk market. Eight district milk centres were founded and combined in a national organisation, the National Association of Norwegian Milk Producers. Those delivering milk to the consumer market were requested to pay a levy which was used to make up the price paid for milk delivered to dairies and cheese manufacturers. In this way the price of milk was raised over the whole country. The sale of milk for human consumption was rationalised, large numbers of distributors were closed down and distribution was systematised. In this way, it became possible to reduce the cost of distribution to a record low level (3½*d.* per gallon, including both wholesale and retail costs).

Dairies had to be re-organised. Smaller plants were closed and attached to larger plants in order to reduce costs. Technical equipment was improved, and so on. In order to finance these measures permission was given to place a small levy on all milk coming on to the market. At the same time extensive propaganda for milk and dairy products was set in motion, with the result that consumption rose considerably. The consumption of milk increased by 10–15 per cent. each year. It was our aim to achieve an annual consumption of 365 litres per consumption-unit—an aim which we were well on the way towards achieving. At the same time far-reaching standardisation of the various products was carried through in association with the improvement of quality.

Through this development, which lasted right up till the outbreak of war, the marketing of milk and dairying were transferred to a co-operative basis throughout the whole country. All dairies passed into the hands of the producers and the same was true of distribution on the liquid-milk market. When it is considered that over 50 per cent. of the income of Norwegian farmers is derived from milk, it will be understood how much a stabilisation of the milk market at remunerative prices meant for them. Similar methods were adopted in other branches of livestock production. In these branches nation-wide organisations were founded such as the Norwegian Meat Marketing Board, the Norwegian Egg Marketing Board, etc.

The measures taken by the producers themselves were supported by the State through subsidies, not least with the object of making these invaluable foodstuffs available for the poorer sections of the population. But the producers also helped to make that possible, whereby the farmers' organisations gained, in addition to their economic character, a strong social aspect.

In order to unite and co-ordinate these various measures we established a National Agricultural Marketing Board, which was given authority to determine and collect the above-mentioned levies for the various products and to distribute these levies in accordance with their various objects. I myself had the honour of being president of the National Agricultural Marketing Board for a number of years from its beginning, and I am proud of being able to say that we succeeded in uniting the many and highly diverse interests in an intimate and fruitful collaboration.

The whole organisational apparatus was voluntary, but supported by legislation. The National Agricultural Marketing Board with its many affiliated organisations is, moreover, a self-governing body, with a Board elected by the producers themselves. But in consideration of the far-reaching powers which were given them it was natural that in the interests of the community there should be a certain measure of control by the public authorities. A report of the activities of the Board had to be given each year to the Government and Parliament.

From the European standpoint the farmers and peasants have been rightly regarded as the backbone of society. In the insecure economic and political conditions which they have endured, all countries have sought to maintain as large a peasantry as possible as a guarantee of food supplies and in order to ensure social stability. As things

developed, this basic attitude led to a situation in which countries were compelled not only to protect their frontiers with cannon, but also with all possible barriers against a rational exchange of goods between countries.

The Atlantic Charter, which all democratic nations have adhered to, gives us the guarantee of a new order providing freedom from want and freedom from fear. We intend to strive for a world order which is built on both economic and social security. We intend to strive for the raising of the standard of living amongst all sections of the population, and the equalisation of the level of town and country.

With the realisation of this programme the demand for foodstuffs will increase, and not least for the so-called protective foodstuffs. That is to say, for all those products which the European farmers, in accordance with their traditions and natural circumstances, are most adapted to produce—namely, livestock products. If eventually each nation is to be adequately fed and unemployment is to be abolished the world will not, I believe, in any foreseeable future experience a surplus of foodstuffs, as we in recent years wrongly supposed there to be.

Agricultural policy could then emerge from its twilight and modern scientific methods will to a far larger extent win their way into agriculture. But if the standard of life of the farmers and the rural population is to be raised, then that will also naturally have its consequences in the social sphere. There will be a demand for the same advantages and for the social benefits which have hitherto been the prerogatives of industry and the urban population. It is possible that this new orientation of agricultural policy cannot be carried through without a certain regrouping of land which has as its aim the stronger consolidation of the millions of small farms and holdings which have existed up till now.

M. P. H. Pedersen

Milk Production on Peasant Farms, with Special Reference to Conditions in Denmark

Milk production is of primary importance to the general health and standard of living of the people, and dairy-farming methods must always command the closest attention of agricultural scientists and practical farmers. I should like therefore to consider some problems of dairy farming where the rather specialised experience of Denmark with its highly organised dairy industry can perhaps be of help.

In Great Britain the type of dairy farm varies much with local conditions, but it is interesting to see that the present emergency has produced a swing-over to a system of combined dairy and arable farming approaching that to which we have been used in Denmark for the last 60 to 70 years. With this system it is common in Denmark to see farms carrying one cow, with young stock, to 3 acres, even though a comparatively small amount of imported concentrates are used.

One-, two- or three-year leys, in which the first cut or the first year's growth is made into hay, are found most useful in Denmark. Indeed, before this war there were hundreds of farms in Denmark with no permanent grass, except perhaps in peaty hollows where a little poor pasture was used for young stock.

The main problem with this type of farming is to supply enough protein in the winter feed. Here the use of well-made silage has been found a great help, and the modern cheap wire, wood or concrete silo has greatly reduced the cost of silage production. On heavy land home-grown beans form a very good protein crop ; they leave the land clean, in good heart and ready for a winter corn crop.

Artificial drying of lucerne and other green crops gives a product of high feeding value and splendid quality. This method has great possibilities and should be of great importance when the drying machines are further improved in output and considerably reduced in price. Tests in Denmark have shown the advantage of partly drying the cut material by leaving it out in bright sunshine for 3 to 5 hours before feeding it to the drier. This may double the output of the machine, and the loss in feeding value is negligible compared with the saving in cost of labour and fuel.

Winter feeding with roots, kale and sugar beet tops could be further developed. The help of practical engineers in improving the implements and machinery for dealing with root crops is very much needed and might greatly cheapen production. A crop of mangels if properly managed and grown on reasonably good soil can produce a very large yield of winter feed. In Denmark roots have for years been the basis of winter feeding. Roots have a bad name with some farmers who claim that they make the cows scour. They have a certain laxative effect, but it is common in Denmark to feed cows with as much as 80–100 lb. of mangels a day.

Feeding with large amounts of roots does of course require an additional ration of protein concentrates, but they supply available carbohydrates in a better and cheaper form than crushed oats or other corn. It is also necessary with heavy root feeding to watch the mineral supply with care.

To obtain the best yield from cows in winter time, at least in northern climates, it is necessary to keep the herd comfortably warm, because quite a lot of energy material otherwise available for milk will be lost in maintaining the temperature of cows if exposed to frost, or to cold winds and rain. The housing problem therefore requires careful consideration. A warm and well constructed cowshed from which the cows in winter go out for only a few hours' exercise every day has been found essential to good milk production in our Danish winters.

A most important aspect of Danish dairy farming is the careful organisation of milk-yield and butter-fat records as a means of grading animals as to their breeding qualities and also the use of these records for an efficient and balanced feeding of the cows. Dairy farmers fall into two categories. The first is the commercial dairy farmer who takes little interest in breeding, but buys his cows near calving or freshly calved and sells them when they go dry. The second is the man who not only breeds for his own use but also sells his surplus cows and heifers to the first man. The aim of the breeder is first to produce a good milk-producing herd and then, by weeding

out inferior cows and breeding from good bulls, to improve his herd still further so as to produce valuable stock for sale. The development and improvement of pure breeds in Denmark is of comparatively recent date. In 1870 a Danish Professor (Prosch) toured a part of Denmark and on his return stated that the cows he had seen shone in all colours of the rainbow, but had nothing else to recommend them. Since then the Danes have paid very serious attention to pure breeding and have largely confined the different breeds to different districts to which they are best suited.

The main point aimed at in actual breeding is the quantity and quality of milk production. This is why particular stress is laid in Denmark on adequate and frequent milk-yield records. Every breeder great or small is expected himself to keep at least weekly yield records and has records taken of yield and butter-fat by the milk-recording organisation every six weeks. It is important that these records should be taken from every cow and first-calf heifer in the herd, since it is impossible to get a picture of the herd as a whole from the records of the selected best animals.

Great stress is also laid on good bulls, since the bull is half the herd. The importance of good bulls cannot be over-emphasised. In choosing a good bull the most important factor is the milk yield on the side of both dam and sire. It is also useful to know the qualities of its brothers and sisters. If for economic reasons it is impossible to buy the best bull, it is better to sacrifice the finer points of appearance and to make sure it comes of good milking stock and can produce good milkers. In Denmark, the recording of progeny has become a most important factor in breeding. As milk recording is generally adopted, the figures for all recorded cows are sent to a central office where they are tabulated in such a form that an opinion as to the breeding value of all registered bulls and of their progeny can easily be obtained. In cattle shows, bulls have to win two prizes, one for appearance and one for descent. In addition, when four and six years old, at least two-thirds of the bull's existing female progeny must be exhibited at the show, thus producing direct evidence of the bull's breeding value.

I should like to say a few words about artificial insemination of dairy cows. This comparatively new method has already proved a success in several countries including Denmark. The question still remains—can it be usefully applied on a commercial scale? If it can, the milk yield of the ordinary dairy herd could be raised considerably in quite a few years and the method would be worth millions to any country. I believe that the process will in the future play a major part in breeding and I think the time is ripe for a large experiment with it on a commercial scale. For this to be successful, the knowledge of the local veterinary surgeon as to the health and history of the herds used in the experiment would be necessary.

The milk produced on the Danish dairy farm is sold to a co-operative dairy. This paper is not concerned with the economic side of co-operation but it would be very incomplete without some mention of a consequence of the co-operative dairy—that is, the return of skim milk to the farmer. The average Danish dairy farmer is also a pig producer. The skim milk returned to him from the dairy forms a most important part of his pig feed. Indeed, it can be said that the bacon industry in Denmark is based on skim milk.

There is little doubt that the success of Danish dairy farming has been due principally to the co-operative system, but in addition to this, these points in actual farming practice have contributed to that success. The most important seem to be the use of short-term leys, the use of skim milk for pigs and especially the keeping of well-organised milk records and the use of these for grading the breeding value of bulls, according to the records of their ancestors and offspring.

M. S. Malessa

The Relationship between Agricultural Problems and Economic Planning

I WANT to take, as the subject of my talk, the relationship between agricultural problems and economic planning. I should like, first of all, to tell you what I understand by this business of planning.

Planning proceeds from the urge to relate and direct economic and social development in a manner that shall secure the fullest biological and cultural progress of nations, beginning with the family, as the foundation cell of all social organisation.

Planning can fulfil its task when :

(*a*) It meets the needs of the individual and the family in regard to the biological and cultural progress of mankind.

(*b*) It embraces whole nations as ethno-geographical units of the same culture, language and settlement.

(*c*) It adjusts national plans in one unit to those resulting from international co-ordination.

In other words, economic planning must seek to change or improve the present economic structure of a country in such a way as to secure the unhampered biological and cultural progress of the family of nations.

A planner approaches his problems firstly by considering human beings as economic subjects and not objects ; secondly, by studying the soil, with maps and charts and statistical data to help him to establish the natural trends of development of each economic unit. By combining and comparing these materials a planner discovers the good features and the bad and tries either to find a corrective or to change the entire structure.

Approaching the problem from the technical side the planner must make a general survey which should take into account in the different areas :

(*a*) The nature of the population.
(*b*) The structure of the population—agricultural or industrial.
(*c*) Disposition of raw materials and agriculture.
(*d*) Location of industry.
(*e*) Transport.
(*f*) Availability of electric power, and
(*g*) Trade.

There are, of course, certain preliminary problems needing solution without which no economic,

technical and physical planning is possible. This applies equally to international and national planning. It goes without saying that all the disruption of the economic structure of nations by war—or as on the continent by Germany—must be taken into consideration ; otherwise the survey would be incomplete. Even in the preliminary stage of general survey it is absolutely essential to determine, primarily, common methods of approach to such statistical and technical problems, as well as to those related particularly to agriculture.

What are the key problems to be solved ? As I see them they can be divided into four main groups.

Firstly, the soil, its natural quality and utility.

Secondly, rural holdings ; morphology, and the general question of size and productivity.

Thirdly, agricultural products ; their processing, storage and distribution.

Fourthly, prices, with special reference to the relationship between agricultural and industrial products.

Here I should like to say a word about two problems ; one relating to size of rural holdings, the other to the matter of prices, which will both help us to realise the vital importance of appreciating the interdependence of agricultural and industrial problems in relation to the whole economy of a nation.

In Eastern and Central Europe we have the system of private ownership, what we term self-sufficing farms or holdings. They comprise such holdings as are able to employ all the members of a family and fully satisfy their own food needs, as well as producing a certain surplus. Self-sufficing farms are potentially more capable of producing a bigger surplus of various foodstuffs than large estates with standardised production. On the other hand, the production of ' dwarf ' holdings, as we call them, is insufficient to feed their own population even on a very low standard. Moreover, they do not utilise their full man-power, thus creating a problem of over-population. It is well known, indeed, that the dwarf holdings of Eastern Europe have made that problem rather acute. The agricultural population of regions where such holdings exist, besides being workless, constitutes an unproductive drain on the national income.

Now, the problem of over-population can be solved by means of two processes. The first implies the distribution of land in such a way as to create self-sufficing farms ; the second the transfer of the unproductive population to other economic sectors, notably to industrial regions. Naturally the first solution means land reform, which would put farms on a sound financial basis, and on the other hand would save farms from further parcelling. The alternative, the transfer of unproductive rural population to industry, requires a new plan dealing not only with agricultural but also with industrial problems.

We have come to the conclusion that both plans, agricultural and industrial, must be merged into one. Should we now prepare plans only for the industrialisation of Eastern and Central Europe without considering the agricultural problems of these regions, we should merely hasten the unhealthy overcrowding of urban populations, already so prevalent in the West. Plans for agriculture, then, comprise not only purely agricultural problems, but also problems affecting the movement of population.

Lack of balance between the prices of agricultural products which the farmer receives and of the industrial products essential for his rural holding is the cause in agricultural countries of a lowering of income level, national and individual ; while in industrial countries it causes the withdrawal of human activity from agriculture. So far too little attention has been paid to this problem in rich industrial countries which can afford to import agricultural products from abroad. This state of affairs, as we all know, cannot continue. For the industrial countries we have to prepare plans on a different basis from the over-populated agricultural countries. We must find out how to transfer part of the population from industry to agriculture and to stabilise income and prices for agriculture so as to make a rural holding pay.

I think the examples I have given show quite clearly the close link between economic planning in general and the special needs of agriculture and industry.

To plan the future economic structure we must, first of all, make a general survey of pre-war conditions.

The four main problems of agriculture as I have formulated them must become the object of a general survey, made in connection with the general survey of non-agricultural spheres. The ultimate aim of planners in relation to the four groups of problems is to find the right solution for the distribution of land and the development of agriculture with a view to assuring the prosperity of the nation and of the individual.

In order to prepare agricultural plans for the transformation or improvement of the existing economic structure we must consider first :

(1) the making of a general survey of the quality and utility of the soil ;

(2) the distribution of rural holdings according to their size ;

(3) the density of the rural population, with special reference to over-populated regions ;

(4) the national and regional location of differing groups of agricultural production ;

(5) problems of communication and transport for the purpose of agriculture ;

(6) problems of mechanisation and electrification of agriculture.

These basic studies will be the foundation on which we can build our plans. To sum up this very short exposition, we see that our post-war reconstruction must be based firstly on plans for the different types of agricultural holdings, according to quality of soil, climate and national customs ; secondly, on plans for the redistribution of industry and agriculture ; thirdly, on plans for a communication and transport system for agricultural products and arrangements for storage ; and lastly, on plans for electrification, which is as essential for the functioning of farm-holdings, transport and distribution as for industry.

I sincerely hope that the British Association for the Advancement of Science, as well as all national

planning organisations, may contribute their powerful aid and encouragement to the determination of common methods of approach to this universal problem, particularly in the initial general survey so essential for the re-organisation of Europe. In this faith I confidently and gratefully look forward to close and constant co-operation with the Free Section of the International Federation of Town Planning.

R. Braude

Milk Production on Small Farms in Poland

DURING the sittings of this Conference, and more especially this afternoon, we have heard very many interesting remarks on livestock and milk production problems of small farmers. The fact, however, that conditions in Western and Northern Europe are completely different from those in Central and Eastern Europe (e.g. Poland) should not be underestimated. Although we can benefit much from knowledge and experience of Danish and Dutch small dairy farmers, comparisons are really difficult, and have mainly theoretical interest.

In the short time at my disposal I propose firstly to describe very briefly the conditions of farming and especially of animal production in Poland ; secondly, to indicate the most important problems connected with the production of milk on the small peasant holdings that will require attention immediately after the war ; and lastly, to make a few suggestions as to how Great Britain, the British Empire, and perhaps other countries, more especially the Americas, could render help which the devastated country will require to enable its dairy production and dairy industry to be rebuilt on sound foundations.

Poland is an agricultural country with nearly two-thirds of its population employed on the land. In 1939 the total population was about 35 million, occupying over 150,000 square miles, an area more than 1½ times as big as the United Kingdom. Two-thirds of the land was under cultivation, and 76 per cent. of the cultivated land was in the hands of smallholders, the Polish peasants. The size of their holdings varied greatly, but the great majority were small. In 1938 there were in Poland about 747,000 holdings of less than 5 acres, 1,136,000 of between 5 to 12 acres, and about 728,000 holdings of between 12 to 24 acres. These three categories amounted to about 82 per cent. of all the agricultural holdings. Of all agricultural property in Poland, 90 per cent. consisted of holdings below 100 acres. Apart from that there was in the country a large but unrecorded number of small households of agricultural workers employed on larger farms and estates, who, although not possessing any land, kept some livestock in small byres attached to their houses. Another important characteristic of Polish farming conditions was that about 89 per cent. of agricultural establishments did not employ hired labour.

There were in Poland great potentialities for cattle production which, however, remained largely undeveloped. Three districts in Poland are particularly suitable for animal production : (1) the lower valley of the Vistula ; (2) the meadow land along the river Dniester and the adjoining districts in south-eastern Poland ; (3) the region known as Podkarpacie, which includes the hill-grazing districts of the Carpathian mountains. The climate of Poland is not particularly suitable for cattle production. The severe and long winter is, of course, a big disadvantage. The rainfall is on the whole too scanty and badly distributed.

Meadows and pastures constituted about 25 per cent. of the cultivated land, meadows 15 per cent. and pastures 10 per cent. From the point of view of cattle industry this ratio appears favourable, but these figures are rather misleading, like many general statistics. Unfortunately the natural pastures and meadows were situated in those parts of the country where farming was least developed, and generally conditions of the natural grassland were unsatisfactory. Only approx. 25 per cent. of Polish meadows can be described as sweet meadows, 43 per cent. were arid, and the rest mixed. Also only about 26 per cent. of the meadows can be classified as dry meadows, while 71 per cent. were wet and only 3 per cent. drained.

It was, however, characteristic of the Polish cattle industry that the natural conditions did not necessarily influence the distribution of livestock. This was rather determined by the density of agricultural population, the size of the peasant's holding and the state of farming development of the particular region.

It can safely be said that the economic conditions of Poland until recently rendered advanced methods of farming difficult, a fact which had its bearing on the development of the livestock industry. The origin of small peasant holdings in Poland was social rather than economic, and until quite recently they were nearly self-supporting units having little commercial contact with the outside world. The peasants kept cattle in order to supply milk and milk products, and to a lesser degree meat, for their families ; an important additional aim was to obtain dung. Until very recently dung was the sole fertiliser of the peasant's land, and it must be said as a tribute to the Polish peasant he regarded it as his duty to keep up the fertility of his native soil, and he did it to the best of his ability.

Not minimising the part which larger farms played and will have to play in the structure of Polish agriculture it is obvious that the small peasant holdings were the backbone of animal production in the country. The average number of cows kept on a peasant holding was about 3·3, but as the number of very small holdings was very high a great many of them had only one cow. As one of the main reasons for keeping a cow was the provision of milk for the household no old or sterile animals were kept. These were sold for slaughter immediately after they were found unsuitable for milking purposes, usually even without allowing any time to bring the animal into fat condition. This, incidentally, was one of the causes responsible for the poor quality of meat in the country. No concentrates or very little, such as millers' offals, oil cakes, etc., were used. There was simply no money to buy them, their value was little known and not appreciated, and the prices obtained for milk and meat did not justify the expenditure. The limited facilities for growing animal food on the small-size holdings often meant under-nourishment of livestock. As a

result, the winter feeding of cattle was quite often reduced to a starvation diet.

There were only three breeds of cattle officially recognised in Poland, namely : (1) the red Polish cattle ; (2) the black spotted breed of the Lowlands which was derived from old country breeds improved by the constant importation of East Friesians, a process continued for generations ; (3) the Simmentaler breed. A considerable proportion of dairy cattle, however, was cross-bred. In some districts inbreeding carried out for generations produced local breeds which, becoming adapted to the local conditions, achieved in some instances excellent performance. All the cattle in Poland must be regarded as dual-purpose breeds. The livestock industry had not reached yet the stage which justified differentiation between dairy and fattening breeds.

Generally it may be said that a very big majority of cattle keepers in the country paid very little attention to animal husbandry. Methodical breeding was carried out only on a few Government establishments and on a small number of medium and large estates. What was even worse was that quite often the best animals in the villages were bought by dealers, leaving only inferior stock for breeding in the hands of the peasants. Other factors, like breeding from too young bulls and heifers, bad treatment of in-calf cows, undernourishment of young calves and improper feeding of the cattle as a whole caused progressive degeneration of the livestock. And side by side with the breeding, feeding and management problems the Polish breeder had to contend with a number of specific problems, the most difficult of which were the lack, until recently, of laws regulating the industry, the low prices of milk and animal products, small consumption, insufficient export, and the serious disorder and primitive stage of distribution arrangements.

Generally the methods of milk production were very primitive. In 1937 the average annual milk yield for the whole country was about 290 gallons per cow. Of the total of 7,000,000 cows the milk yield of only about 100,000 was properly recorded. Only about 20,000 of the recorded cows belonged to the small holders. The average milk yield of the recorded cows, the best in the country, was about 650 gallons per annum.

Speaking generally the small peasant holdings should be suitable for the intensive development of animal production. Their owners are able to provide the labour required for intensive husbandry, give personal attention to the animals, and, if properly organised, should be capable of developing the industrial side of animal production. On the other hand, owing to the lack of capital necessary for the most basic investments, the Polish peasant has not had the opportunity of changing from extensive to intensive farming. This fact is of course correlated with the structure of the home market for animal products which, owing to the small industrialisation and the small proportion of urban districts, as well as to the comparatively low standard of living, was inelastic and could not absorb the surplus which the producer could supply. On the other hand the backward state of animal industry was partly responsible for the low consumption of home-produced products, thus apparently creating a vicious circle, due mainly to the inferior quality of the home products and to defects in distribution.

A considerable measure of improvement of the cattle industry in Poland had already been achieved by the measures taken by the Polish Government before the outbreak of the war. Without going into details I would like to mention two important Acts of Parliament connected with the livestock industry : (1) of March 1934, dealing with the husbandry side ; (2) of September 1936, dealing with the milk industry. Also the great development of the co-operative movement, as well as of other public-spirited agricultural organisations, was contributing effectively towards the same end. Unfortunately time was not given the Polish nation to develop its agriculture and much of the work will have to start again.

To what extent Polish agriculture has been destroyed by the present war and German occupation it is difficult to estimate, but there is no doubt that great efforts will be needed to rebuild it. As far as milk production on small holdings in Poland is concerned, the main problems can be summarised as follows.

(1) Organisation of peasant holdings, including regulation of the size of holdings, provision of capital for basic investments and equipment, and control of building construction.

(2) Provision and maintenance of suitable livestock.

(3) Improvements in feeding and management of dairy stock.

(4) Introduction of general veterinary supervision.

(5) Control of quality of animal products, especially of milk, dairy products and meat by introduction of official testing and grading.

(6) Control of prices of agricultural products in order to maintain a right proportion between the cost of raw materials used in livestock production and the cost of animal products.

(7) Support of the domestic farm industry, especially of butter and cheese making.

(8) Drive to reduce the seasonal difficulties of the livestock industry by developing large milk-conversion factories and cold-storage systems.

(9) Organisation of the distribution of animal products by support of co-operative movements, provision of better marketing facilities, improvement in the slaughtering arrangements, organisation of distribution centres, regulation of transport of goods, development of credit organisations, control of activities of the middlemen, etc.

(10) Increase in the consumption of animal products throughout the country by supplying good-quality products at controlled prices and by a countrywide propaganda campaign dealing with the nutritive value of milk, dairy products and meat.

(11) Organisation of export.

(12) Organisation of the education of peasants, which should include general education, agricultural education, evening classes, peasant clubs, technical courses for young farmers, country libraries, etc.

(13) Organisation and maintenance of advisory centres in each district throughout the country with staff able to advise on breeding, rearing, feeding, management and disease problems, appointment of village advisors from amongst the

peasants, maintenance of demonstration farms, organisation of competitions, etc.

(14) Professional education and research. Organisation of applied and purely scientific research stations, which would keep in contact with the development taking place abroad and solve problems arising out of local conditions.

Let us now consider to what extent the realisation of the scheme mentioned can be assisted by help from abroad. I believe that when the war is over the only country in Europe which will be in a position to help the Polish agriculture will be Great Britain, except for the part which will be contributed by the return of some of the stolen goods from Germany. It is obvious that the condition of the country will be terrible, and at least some of the help will have to come soon after the restoration of the country's freedom. This means that a plan of action must be prepared beforehand. Of course we have to win the war first, but I believe that without in any way interfering with the war effort this important work could be undertaken now. In my view it should include, as far as the Polish milk industry is concerned, the following programme.

(1) Organise a ' first-aid ' relief mission to save existing livestock from starvation and stop the spreading of disease.

(2) Organise a committee of experts to review and report on the conditions.

(3) Set aside stocks of suitable grass and clover seed for the restoration and improvement of pastures and meadows.

(4) Prepare stocks of suitable animals to be transported to Poland to form a nucleus of a new livestock industry.

(5) Organise an international service of artificial insemination.

(6) Lay down stocks of concentrated feeding stuffs for livestock which will have to be transported to Poland during the time when it will not be possible to produce them locally.

(7) Provide funds and credits for basic investments like reclamation, drainage, water supply, housing, etc. Provide a market for the livestock products which will have to be exported from Poland. From the two possible main importers of Polish agricultural goods, Britain and Germany, we would choose without hesitation Britain, and it will be up to her to facilitate this arrangement.

(8) Support the development of dairy and meat industries.

(9) Organise a mission to help to rebuild educational institutions, universities, agricultural colleges, advisory centres, research stations, etc.

(10) Accumulate supplies of technical appliances, instruments, textbooks, etc., to help to re-equip the scientific institutions.

(11) Provide training facilities in this country for advanced students, to enable them to finish their studies in appropriate surroundings. This may include a scheme of providing lectures and demonstrations on agriculture to the interested members of the Polish Forces now stationed in this country.

(12) Organise international co-operation of breed societies and milk recording organisations. This during the first period after the war may mean the provision of advice and technical skill for building up these institutions in Poland.

It is obvious that huge possibilities for improvement and for new development exist in all the branches of the livestock industry. Enterprise with initiative, sound knowledge, modern equipment and capital will be required after the war. The future of the Polish peasants, and thus of Poland, will depend on them. To help a nation in need should make it worth while to think about these problems well in advance.

M. P. A. Moltesen

(Agricultural Attaché, Danish Legation)

THE problem of small *versus* large farms has lately aroused very much interest in this country and I am convinced that this problem is one of the most important ones in a discussion about the agricultural economy of post-war Europe.

I think that the agriculturists who are in favour of large-scale farming may be right that large units are more economical than small units, but as a representative of farmers in Denmark where practically all farms must be considered small, I must say that there are so many imponderables connected with peasant farming that we are not allowed to consider the question of the size of the farms from an economic point of view only.

I believe that in most European countries we shall, in post-war days, have to take the peasant farms into the account and I am, therefore, very grateful that the British Association for the Advancement of Science has placed so many and interesting subjects concerning the special conditions of the smaller farms on the agenda of this conference.

One question of the utmost importance for the small farmer is the form of tenure. In this country we know the landlord-tenant system, and in Russia they have introduced the system of State tenure, while in many other European countries we find that most of the agricultural holdings are farmed by owner-occupiers. In my country, e.g., about 95 per cent. of the holdings are farmed by owner-occupiers.

In planning the future of European agriculture I think that we ought to remember that there is a good deal of truth in Arthur Young's dictum, ' The magic of property turns sand into gold.'

I know that an authority like Sir Daniel Hall in his recently published book *Reconstruction and the Land* says that no more deceptive half-truth ever found acceptance than this dictum of Arthur Young. Sir Daniel Hall may be right that this dictum does not hold good in this country, but the experience from Denmark and probably also from several other countries tells us that, if the owner-occupier system is combined with a credit system which affords the farmers cheap long-term credit, this form of tenancy creates the best and most satisfactory working conditions for the farmer.

Our Chairman, Sir John Russell, quoted in his Trueman-Wood lecture to the Royal Society of Arts an old Scottish farmer who said that you must live as if you were going to die tomorrow, but you must farm as if you were going to farm for ever. This saying is not only beautiful, it is a golden truth. Do you, however, believe that a farmer will farm in that way with the right

zeal if he has not the confidence that he himself or his son will reap the fruits of his labour ?

As I attach so great importance to the system of tenure, and as I must admit that the system of owner-occupiers absolutely must be connected with good possibilities for obtaining cheap long-term credit, I beg to suggest that the problem of agricultural credit may be placed on the agenda of any future conference.

Dr. Eygenraam, Mr. Fjeldstad and Mr. Hostrup Pedersen gave us some very interesting information regarding some livestock problems of the small farmer.

An important pre-war and war problem was, and is, how to procure the feeding stuffs rich in protein. In most European countries with intensive farming the bulk of the feeding stuffs rich in protein used to be fed in the form of oilcakes, imported from overseas countries or manufactured from imported seeds. During the economic war preceding the present political war most countries, as part of their endeavours to save their currencies, tried to establish a kind of self-sufficiency in feeding stuffs by growing legumes and preserving the crop by natural or artificial drying or by converting the crop into silage.

In the present circumstances farmers in the European countries have been forced to increase their production of these kinds of feeding stuffs. But what is going to happen to this production after the war ?

If it will be possible—and I believe that it will be possible after the war as it was before the war—to buy the oilcakes and oilseeds cheaper from the overseas countries than growing the feeding stuffs rich in protein ourselves, we shall, of course, not produce hay and silage to the same extent as we are doing now, and thereby we shall acquire more acreage for the production of other crops than feeding crops.

The smaller farms of Europe will probably have as their main object the intensive production of protective foods, milk, dairy produce, meat and eggs, based on home-produced carbohydrates and on imported proteins, as well as vegetables and fruit.

Dr. P. P. Fano

Dr. Feierabend said this morning that the sturdy yeoman represents the foundation of every human society, and, he added, this has been recognised alike by capitalists and Bolsheviks, Italian Fascists and German National Socialists—though in different forms by each.

I think it may be of some interest to this meeting to know how the much advertised Fascist policy towards the betterment of the Italian 'sturdy yeoman' has worked out. Before Fascism came to power there was a trend towards the transfer of the proprietorship of the land from the non-operating capitalist landowners to the individual peasant labourers or to their farming co-operatives which, up to 1922, were flourishing as in no other country in Europe. As soon as Fascism took power this trend was stopped, farming co-operatives were destroyed, and many of the newly acquired peasant farms were re-absorbed by the capitalist entrepreneur. At present we can assume that large and medium farms operated by capitalist entrepreneurs cover two-thirds of the agro-forestal area, while the remaining third is divided into extremely small units distributed among peasant labourers who cannot draw a livelihood from them, and are thus compelled to become wage workers on the capitalistic farms, competing in their quest for work with the enormous number of landless peasants. The Fascist Government has done nothing to better their lot, much to worsen it.

The much advertised reclamation schemes have not in any way been connected with a substantial redistribution of the reclaimed lands.

The battle of wheat—as much advertised as the reclamation projects—has had a very bad effect on the economic conditions of the peasant farmers. Owing to the smallness of his farm the peasant farmer has, in general, no surplus of wheat to sell on the market and consequently is not in a position to profit by its high price enforced by high tariffs and other devices.

The high protective industrial tariffs combined with the high price of bread—which is the main food of the Italian workers—has brought about high prices for all industrial products, including farm machinery and fertilisers, thus hitting again the peasant population. The tendency of the capitalistic farmers has been to make good the loss for high prices of industrial producers by lowering the wages of the peasant labourers, among whom are to be found also the majority of the peasant landowners. This kind of policy has proved very useful in furthering the aims of the Fascist Dictatorship. The Government has compared the wealth of other nations with the poverty of Italy and has urged the hungry peasants to external conquests in order to better their lot. Thus, by means of hunger, oppression and propaganda the quest for a better social justice has been diverted from the demand of social and technical reforms at home to imperialistic greed of conquest.

Dr. E. J. Bigwood

I would like to draw attention to a point which I think is an essential one in post-war reconstruction—that is, the Nazis' New Order programme with regard to agricultural policy in occupied countries and its consequences in the future from the point of view of public health.

The case I am going to consider is that of Belgium. But it seems that what happens in that country is but one example of a more general scheme and is therefore of wide interest.

In peace time Belgium's agricultural policy was, in many ways, similar to that of Great Britain's. Although the country was chiefly engaged in industrial and commercial activity, nearly two-thirds of its surface area was used for agricultural purposes. And yet Belgium's home production of food was far from meeting its population's requirements. In terms of cost, the deficit was of the order of 25 to 30 per cent., but in terms of calories, that is to say of energy requirements, the deficit was as high as 50 per cent., and it comes even higher than that when you take into consideration the large imports of feeding stuffs for domestic animals.

How are we to explain such a situation ?

Half of Belgium's agricultural land corresponded to pastures. If we include the surface for fodder

crops in our calculation, we see that about 75 per cent. of our agricultural domain was used for domestic-animal rearing and breeding. In other words, Belgium's agriculture was chiefly engaged in the production of meat and dairy products. The more this happens to be the case the more a country depends on its imports in order to meet the energy requirements of its population. This is due to the fact that per unit surface of land the yield in calories is, on an average, at least ten times greater in the case of crops than it is in the case of production of food of animal origin.

Germany's policy in occupied Belgium tends to convert sufficient pastures into grain, potatoes and sugar-beet crops to render the country self-sufficient in its population's caloric requirements. It brings back the country's position to what it was a century ago. It will tend to throw the diet of its inhabitants entirely out of balance from the physiological point of view, by exaggerating the deficiency of consumption of protective foodstuffs which existed already before the war. It will lead to an increase of such foods which were consumed in normal or even exaggerated amounts, whereas it will tend to cut down the consumption of such other foods which were insufficiently consumed.

The Nazis' social conceptions are, according to Dr. Ley's well-known statements in Berlin, that food habits of all populations need not be adjusted to a common standard of optimal nutrition. Not only is that not necessary, but it is normal, according to him, that certain populations be kept at a low grade of nutritional status and others, including the German population, of course, at a high level of nutrition. The Nazis' agricultural New Order is now being carried through in accordance with such principles.

Moreover, if such a policy is generalised in the majority of the occupied countries in Europe and if it is not corrected in due time, it will not only be harmful from the point of view of nutrition, but economically it will lead to a situation really paradoxical in so far that these countries will tend to produce more and more, at home, those kinds of foodstuffs which are least perishable and of which there exist already large world surpluses, whereas they will tend to depend more and more on shipments from overseas for their supply of the most perishable types of food which ought, in reality, to be consumed as fresh as possible where they are produced.

Indeed, it will be necessary to take this into consideration when post-war reconstruction is considered with regard to agriculture.

Sir E. John Russell, F.R.S.

Sir John Russell, F.R.S., summarising, said that the Conference had displayed a very considerable degree of unanimity about the problems of agricultural reconstruction and the ways of dealing with them. While the problems were admittedly difficult, this similarity in outlook augured well for finding satisfactory solutions.

Several speakers had emphasised that a purely economic solution was inadequate ; it was impossible to consider the peasant merely as an economic unit apart from his land and without regard to the almost mystical relationship existing between him and it. Land was not only a means of livelihood to the peasant, but an integral part of his being.

There were two sharply contrasting views about the future development of European agriculture : (1) the Nazis', that postulated a Europe self-sufficient in foodstuffs and therefore immune against blockade, and (2) the view generally expressed during the Conference that envisaged an agriculture aiming at attaining the highest possible standard of nutrition for the peoples. The Nazis' plan involved a considerable extension of grain production, and consequently lowered standards of life for both peasants and townspeople, an increasing social dissatisfaction and political unrest, and finally and inevitably war. The alternative plan involved greater concentration on the production of protective foods and the importation of a part of the grain and fodder requirements from extensively farmed regions overseas.

All were strongly opposed to an agricultural system subsidised and directed to war activities. Equally, all were agreed on the advantages of utilising the land to improve the nutrition of the people. For this purpose the large land units and intense mechanisation characteristic of the low-cost agriculture of grain-producing countries were unnecessary and even undesirable in Europe. One of the chief problems in European agriculture was how to make efficient use of more labour per unit area of land. This could be achieved by small-scale mixed farming.

The chief economic requirements for a prosperous peasant-operated agriculture were (1) the development of intensive types of farming with a rapid turnover, (2) co-operation in buying, processing and marketing, together with adequate credit facilities, (3) assured markets, and (4) the employment of the surplus population, for which two means had been suggested—rural industrialisation and emigration. Several speakers had pointed out that it was impossible to treat European agriculture as an isolated problem, and particularly if protective-food production were encouraged at the expense of grain it would be necessary for European countries to come to some agreement with grain-growing countries with a view to regulating production and stabilising prices. Nearer at home, the success of any plan for agricultural reconstruction of Europe would depend on the course of British agricultural policy.

Some degree of international as well as national planning seemed inevitable. Long-term planning was not the immediate concern of the Conference, but since long-term and short-term policies were interdependent, the subject of planning had often arisen during the discussions. The general feeling was that planning needed to be carried out on a basis of regional rather than of political units. The physical qualities of different regions required careful study and survey, since any scheme that planned to produce beyond the natural capacity of the locality was foredoomed to failure. Much could be done, however, to extend the range of a region's productive capacity by the application of scientific methods and technical improvements. Happily, international collaboration in applied agricultural science was already well advanced.

He had already suggested in his introductory remarks certain practical measures which could

be initiated forthwith so that effective action could be taken immediately after the conclusion of hostilities ; and other measures had been proposed during the course of the Conference. These proposals and the general conclusions of the Conference would be referred to the Inter-allied Reconstruction Committee which had been set up and had already begun its work.

At the conclusion of the Conference, a resolution was addressed to the Council of the Association, requesting the appointment of a standing committee under the chairmanship of Sir John Russell, F.R.S., to advance the application of scientific methods in the reconstitution and intensification of European agriculture, with a view to the restoration and maintenance of the well-being of agricultural communities, and to keep such objects before all who are or may become concerned with the resettlement of devastated lands. This Committee has now been set up (see p. 184).

THE INTERNATIONAL RESEARCH COUNCIL

(LATER THE INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS)

BY SIR HENRY LYONS, F.R.S.

(Note.—In view of suggestions made by speakers at the Conference on Science and World Order in September 1941 *concerning possibilities of international collaboration in science through some form of standing organisation, the subject of this paper is specially appropriate in these pages.)*

'THE INTERNATIONAL RESEARCH COUNCIL,' or the 'International Council of Scientific Unions' as it has been entitled since 1931, will certainly not continue to exist in its present form after this war. International scientific co-operation there must be as soon as more peaceful conditions return, and the form that this should take will require very careful study and consideration. It may therefore be useful to place on record how this Council came into being, and with what measure of success it carried out its purpose since it was first constituted in 1919. New world conditions will demand differently constituted organisations, but something can usually be learnt from those which have been employed in the past.

Since the seventeenth century the Royal Society has always maintained friendly relations with the scientific men and institutions of other countries, and in the second half of the nineteenth century this branch of its activities became more widely developed owing to the formation of a number of international scientific organisations the aim of which was to initiate and to foster international co-operation in many branches of science. With most of these the Society has been directly related ; some of them had for their object the establishment of uniformity in standards of measurement ; others promoted the advancement of science by co-operation, others aimed especially at encouraging the personal interchange of opinions between those who were investigating the same branch of science.

The earliest of these was the Bureau International des Poids et Mésures, which was established at Sèvres in 1873 on the recommendation of an international commission which had been appointed in 1869 to consider the construction of metric standards of high accuracy. Great Britain only became a member of the convention regulating the Bureau in 1884.

The International Geodetic Association developed from the International Mid-European Geodetic Association which had been established at Berlin in 1861 ; Great Britain joined this in 1884 but did not contribute to it as a subscribing member until twelve years later. In 1896 a Geodetic Convention was concluded having a membership of twenty-three states, Great Britain being one, and each of these paid an annual subscription calculated on the basis of its population. The British delegate was nominated by the Council of the Royal Society.

In 1903 the International Seismological Association was formed much on the lines of the Geodetic Convention and Great Britain joined it in 1904, the British delegate to it being nominated by the Council of the Royal Society. The annual subscriptions which were due to these two organisations under the conventions governing them were paid by the Government, and amounted to £300 and £160 respectively. Both of these Associations came to an end during the war of 1914–18.

For some years before 1898 the Academies of Munich and Vienna, together with the Royal Societies of Göttingen and Leipzig, had been in the habit of meeting annually at one or other of these places as an Association to discuss scientific matters of common interest to them, and in 1898 their meeting was to be held at Göttingen. Early in 1898 the Royal Society of Göttingen invited the Royal Society of London to send delegates to take part in the meetings and the discussions ; it was also intimated that the four collaborating institutions would be glad to learn the Royal Society's views on the possibility and desirability of joining them. The Council accepted the invitation, and instructed their delegates to say that the Society would be disposed to join the Association provided that it were so enlarged as to be of a fully international character. The suggestion was accepted in principle by the group of German and Austrian Academies, and the Royal Society, being an independent institution whose actions did not require the approval of any Minister of State, was asked by them to take such steps as might be necessary in order to ascertain how far the formation of such an international association might commend itself to the leading scientific bodies of other countries.

Enquiries were therefore sent by the Council of the Royal Society to the Academies of Paris, Rome, Washington and St. Petersburg, and these institutions declared themselves to be in favour of accepting the proposal ; a preliminary con-

ference was therefore held at Wiesbaden in October 1899, at which a scheme was drafted which provided for triennial meetings of the new Association, and this was adopted by a General Assembly which met in Paris in 1900. The International Association of Academies, as it was called, held four other meetings at intervals of three years, and another was to have been held at St. Petersburg, but it was cancelled on the outbreak of war in 1914.

Under the regulations which had been adopted in 1900 an Academy might be admitted to the Literary Section or to the Scientific Section of the Association, but not to both unless its constitution provided that the sphere of its activities included both literary and scientific subjects, as was the case with most, if not all, of the other academies. The Royal Society, however, by its aims and its constitution could only be a member of, and vote in, the Scientific Section. At that time there was no society existing in England which was deemed competent to represent the United Kingdom in the section dealing with historical, philosophical and philological studies in such a manner as would satisfy these conditions; the Royal Society could represent it in the Scientific Section, but it had no vote in the Literary Section.

The Council therefore consulted several distinguished men of letters in order to see how this disability could be removed; they suggested that the Royal Society might enlarge its own scope so as to include a section corresponding to the philosophical, historical and philological divisions of some foreign academies. The matter was one of great importance to the advancement of two great branches of human knowledge in this country, and the Council discussed it at several meetings; finally it was agreed that the whole matter should be considered by a general meeting of the Society in order that all aspects of the question might be thoroughly examined. Ultimately it was agreed that, while fully sympathising with the desire of those interested in the study of history, philosophy, philology and archæology for a representative institution dealing with their branches of knowledge, the Society was not in favour of extending its own field of activity to include the humanities as well as natural science. The establishment by Royal Charter of a new institution was considered to be preferable to enlarging the Royal Society and altering its existing charter. Representations were therefore made to the Privy Council explaining that in the opinion of the President and Fellows of the Royal Society this would be the best solution of the problem. A new body—The British Academy for the Promotion of Historical, Philosophical and Philological Studies—was therefore formed, to which a Royal Charter of incorporation was granted on August 8, 1902.

During the war of 1914–18, when meetings of many existing international organisations could not be held, neutral countries such as Holland, Switzerland, Norway, Sweden, Denmark and others found that their discontinuance was very inconvenient, and they therefore began to organise new associations among themselves. This was undesirable as it might easily have led to the formation of separate scientific groups representing the Allied Powers, the Central Powers and the neutral countries, inevitably perpetuating the differences which had already been caused by the war.

In the spring of 1918, therefore, the Royal Society, the Académie des Sciences of Paris and the National Academy of Sciences at Washington discussed informally the form in which the scientific undertakings which had previously been carried on by international co-operation might work together in the future. The outcome of this was that the academies of all the allied countries, which alone were at the time accessible, were invited to send representatives to a conference which took place in London at the rooms of the Royal Society on October 9, 10 and 11, 1918.

Though the Association of Academies had proved very successful in establishing closer and more frequent contact between the academies of various countries, academies elected distinguished men of science in other countries to the honorary membership of their own institutions, but had not been able to do very much to advance international scientific co-operation. From time to time it had assisted the Solar Union, the Marey Institute and the International Committee for the annual publication of tables of physical and chemical constants; it had also appointed a Permanent Committee to deal with the Functions of the Brain. One inconvenience was that one country might have more academies and therefore have greater voting power than another irrespective of their relative scientific activities. Germany had then four academies, to which Heidelberg has since been added, and their delegates, who held preliminary meetings to discuss the agenda that were to be dealt with, were able thereby to speak and vote as a single block, thus introducing a political element into the meetings which was neither anticipated nor desired.

The meeting of October 1918 in London was followed by another in Paris which met from November 26 to 29, 1918, directly after the armistice had been signed, and at this, after much discussion, it was decided that another meeting of delegates from the Allied Countries should be held in Brussels in the course of the summer of 1919. In the meantime a small committee was appointed to prepare a draft set of statutes defining the constitution of the new organisation which would be formed, and would only concern the Allied Countries who were represented at the London and Paris meetings. The admission of the Central Powers was not considered to be practicable then, and even the inclusion of the neutral states had to be postponed until the meeting at Brussels had taken place.

In July 1919 the first General Assembly of the International Research Council, as it was to be called, met in Brussels to discuss the draft statutes. The Assembly was welcomed by the King of the Belgians, who addressed the delegates and invited them to hold the periodical meetings of the General Assembly at Brussels. This act of well-meant hospitality, which was quite unexpected, at the time was warmly greeted and gratefully accepted; but later it was quoted in many quarters as indicating the definitely political character of the whole organisation, and was made an excuse by some countries for declining the invitation to join which was sent to each of them a few years later.

At this first General Assembly the statutes which the committee had drafted were adopted with certain modifications, and it was decided that they should come up for consideration, and if desirable for revision, in twelve years' time, that is in 1931. At the same General Assembly International Unions for Astronomy, Geodesy and Geophysics, Chemistry and Mathematics were formed and their statutes were approved, as well as those of the Research Council. Other Unions for Physics, Scientific Radio, Geography and the Biological Sciences were proposed, but the consideration of their statutes was postponed until the next General Assembly which met at Brussels in the summer of 1922.

The unit of subscription which each country was to pay annually on becoming a member of the Research Council or of an International Union was laid down in the statutes, the number of units to be paid by any country being dependent on its population and varied from one to eight units.

In most countries the funds for this purpose had to be obtained from the government, and this was in some quarters considered as giving the scheme a political character.

These statutes having been accepted by the representatives of the Union concerned and approved by the International Research Council, it was for each nation's delegates to obtain their acceptance by their government, academy or other institution, which was to be responsible for the regular payment of the subscriptions to the Research Council, or to a Union.

The Unions were completely free to manage their own affairs in accordance with their statutes when these had been approved by the General Assembly of the Council ; they admitted new members who were qualified, fixed the dates of their meetings ; collected the subscriptions of the countries which had adhered to them as prescribed in their statutes. These were sometimes paid to them direct, and sometimes sent through the Research Council. The Research Council did not interfere with them in any way, except in one particular which has not been properly understood and often misrepresented. At the second meeting of the General Assembly in 1922, a proposal was adopted requiring that any country wishing to join a Union should previously become a member of the Research Council. The reason for this was that several states which had joined this or that Union had assumed that they had thereby become members of the Research Council also, and complained when they did not receive notices of its General Assemblies. As the subscription to the Research Council was very small the best solution seemed to be that all states should join the Research Council as well as such of the Unions as they might wish to join. No interference with the Unions was either intended or desired, but the action was widely represented as having been taken with this object.

By its statutes each International Union required that each adhering Academy, Society, Research Council or Government should appoint a committee to maintain contact with the Bureau of the Union and to keep its adhering authority advised of all that the Union was doing. These were, rather unfortunately, called National Committees ; they were national committees from the point of view of the Unions' officials, since they formed the normal means of communication between the countries adhering to the Union and its Bureau ; but in each country they were appointed by the Academy, Society, Council or other adhering body to carry out its instructions. This had not always been understood, and some National Committees have from time to time undertaken work or incurred liabilities, assuming that they were fully authorised to deal with any matter relating to the scientific matters within their purview, in their own countries.

In 1922 the neutral countries were invited to join the Research Council and the Unions ; they accepted and formed a valuable addition to the adhering countries.

In 1925 Great Britain, the United States and the Scandinavian countries associated themselves with a proposal made by Norway that the Central Powers should now be invited to join also, in order to form a fully international organisation. This involved a modification of the statutes for which a specified majority of the votes held by all the adhering countries was necessary. The number of such votes held by any country varied from one to five according to its population, and therefore at any meeting it was difficult to say, until the final voting by countries' delegates had been carried out, what number of votes would be cast. From the discussions which took place on the Norwegian proposal in 1925 it seemed fairly certain that the necessary majority would be obtained, but during the mid-day adjournment a rumour was current that this would not be the case. Consequently several delegates who had intended to support the proposal voted against it and others abstained. The motion was consequently lost. This, of course, was hailed in some quarters as indisputable proof of the political character of the whole organisation and greatly increased the difficulty of the situation. The Royal Society was much dissatisfied with the result, which was wholly unexpected, and demanded that a Special General Assembly should meet in 1926 and reconsider the proposal. This was agreed to, and the proposal was then adopted by a large majority, but the mischief had already been done.

On the whole the eight international Unions which were appointed in 1919 and 1922 have worked reasonably well, and in some cases much better than might have been expected.

The Astronomical Union utilised the numerous international astronomical committees which were already working, eliminated some and arranged that the others should report to the Union at its triennial General Assembly. This has apparently worked very successfully.

The Union of Geodesy and Geophysics probably undertook too large a field of action ; it has been suggested that there should have been separate unions for (*a*) Geodesy, and (*b*) Geophysics, but this has never gained general support. There seems always to have been a fear lest geodesy should retain the larger share of the income from subscriptions, and that the geophysical units would be financially worse off than they were. It is always difficult to obtain increased grants from the finance ministries of a number of countries unless they can be included in the estimates

of the technical departments most directly concerned, and these object to being responsible for grants which they do not themselves administer. At first this Union consisted of seven sections for Geodesy, Meteorology, Seismology, Atmospheric Electricity and Magnetism, Physical Oceanography, Volcanology, Scientific Hydrology ; but in recent years these have called themselves Associations and have become almost independent organisations.

At the time that the new organisation was formed in 1918 and 1919 it was agreed that there should be no permanent bureaux established in any country ; that for Geodesy which had existed for many years past at Potsdam had made the International Geodetic Association practically a German organisation ; nevertheless there has been a bureau of Geodesy at Paris since 1920, and also one for Seismology at Strasbourg ; for some years past one for Volcanology has been maintained at Naples. In these and in other ways the organisation was developing a somewhat political character which by some was thought to overshadow the scientific aims which it had been formed to develop.

The Union of Chemistry had the advantage that in every country there existed already a well-organised body of chemists who had been in the habit of meeting periodically to discuss matters of common interest. Their Union therefore was quickly formed and had worked very satisfactorily. For a good many years its National Committee in this country was not appointed by the Royal Society but by the Federal Council of Chemistry, which accepted responsibility for the expenses incurred by its appointed delegates. In 1936, however, it was transferred to the Royal Society's list and since then has been administered in the same way as the other National Committees.

The Union of Mathematics which was appointed in 1919 is no longer in existence ; its General Assembly met three or four times, but in 1932 at Zurich the liquidation of the Union was decided upon by a majority of the countries represented at that General Assembly, since the simpler organisation of a Congress meeting periodically was preferred.

The Union of Scientific Radio which was founded in 1922 under the presidency of the late General Ferrier has had a most successful career and under his direction and later under that of Sir Edward Appleton has done excellent work.

The Union of Pure and Applied Physics has not been so successful. It was formed in 1922, but no General Assembly was held until 1934, when a joint meeting of this Union and that for Scientific Radio was held in London. Since then there has been no meeting nor have any reports been issued.

The Union of Geography which was formed in 1922 followed the example of the Union of Chemistry and took over the arrangements for periodical meetings of the International Geographical Congress which had existed for many years previously. The Union at first met triennially, but recently the interval between its General Assemblies has been increased to four years.

The Union of Biological Sciences was established in 1922, but for some years it was not very active. Recently, however, the Botanical Section has been reorganised. The Zoological Section has not yet been active.

At the first General Assembly, which was held at Brussels in 1919, proposals were made for the formation of an International Union of Geology and also another for the Medical Sciences. These have not, however, received much support and the proposals were dropped at the next General Assembly, which was held in 1925.

The funds from which the various National Committees paid the subscription of their country to the Research Council and the Unions have usually been provided by their respective governments, and this inevitably suggested that political influence might override the scientific aims of some of the Unions. No limit to the tenure of office by presidents of the Council or of the Unions had been laid down in the statutes of 1919, their election having been left to the delegates who attended the General Meetings ; but when the first president of the Research Council held office for twelve years, and the president of one of the Unions for a similar period, this was taken in many quarters to indicate a political trend in the organisation's policy. In the new Statutes of the Council in 1931 the president's period of office was limited to that between two General Assemblies. The same rule was adopted later by the Unions.

Those who had most to do with the planning of the organisation and the drafting of its statutes had given much attention to the need for avoiding any appearance of political influence, but, as it turned out, not wholly successfully. When the time comes for planning anew some form of international scientific co-operation, it might be well to consider whether one based on the various sciences might not be preferable to the national representation of the past twenty years. The numerous congresses such as those of Chemistry, Geology, Geography, Mathematics, Physiology, and many others have accomplished a large amount of useful scientific work at their congresses and have brought together many scientific workers, without any interference from political aspirations. Their cost has been moderate, and was probably considerably less than that of the Council and Unions.

The question has been asked from time to time of what scientific value was the Research Council or its successor the Council of Scientific Unions. The reply must be : very little ; a joint committee to study the relation of Solar and Terrestrial Phenomena, the members being nominated by the Astronomical and Geodetic and Geophysical Unions. It has done very good work, but it might have come into existence irrespectively of the Council. The Council has proved convenient to national representatives who desired information about its work and that of the various Unions. In 1931 the question of its continuance was raised, but a large majority of the national delegates, who attended the General Assembly when the revision of statutes was under consideration, decided against any change.

The subscriptions of this country to the Council and its Unions, as well as those to certain other scientific organisations, also the expenses of the delegates selected to attend them, were met from a special Parliamentary grant.

SCIENCE IN BRITAIN

THE BRITISH ASSOCIATION

By Sir Richard Gregory, Bt., F.R.S.

(Note.—This is the English text of a broadcast recently prepared by the President of the Association for a series of talks on British science given in South American programmes of the B.B.C. in Spanish and Portuguese. It outlines the peacetime activities of the Association, some of which are necessarily in abeyance now; it will therefore interest especially those who have come into contact with the Association only during the war period.)

The British Association for the Advancement of Science was founded in the year 1831. In the same year the world-renowned naturalist, Charles Darwin, left England in H.M.S. *Beagle* as a member of the famous expedition to the Pacific. Between 1831 and 1836 the expedition surveyed the South American coasts and adjacent islands, including the Galapagos Islands, and also the coasts of Australia and New Zealand. Darwin recorded that the voyage was the most important event in his life and it determined his whole career. The geological and other natural history notes made by him during the voyage, especially along South America, were the basis of most of his later works.

Exactly a century ago, Darwin prepared a short account of the facts observed by him which indicated relationships between different living things and suggested a common line of descent. Also, in the year 1842, was published his great work on 'The Structure and Distribution of Coral Reefs,' which gave the results of his own observations of coral atolls in the Pacific and Indian Oceans, and threw new light upon their structure. He suggested that cores should be obtained by borings of such reefs in order to discover how deep the coral rock extended below the limit of about thirty fathoms in which the coral organisms can live. The British Association was the first body to set such a project on foot, with the result that cores obtained at depths of more than a thousand feet were found to be built up of the remains of coral organisms living near the surface of the ocean.

One of the chief characteristics of the British Association is that of taking the initiative in promoting or undertaking scientific investigations of this kind. This applies also to other movements of national interest to which the Association gives its authority and appeals for support. The acquisition and preservation of the house in the village of Downe, Kent, where Darwin lived for forty years and wrote his great work on 'The Origin of Species,' was the result of such an appeal made at an annual meeting of the Association by the President, Sir Arthur Keith. Darwin took up his residence in the house exactly a century ago and died there in 1882. Through the generosity of a distinguished surgeon, Sir Buckston Browne, the house and grounds were purchased in 1927 and transferred to the possession of the British Association, with an endowment towards its maintenance as a national memorial. The chief rooms have in them furniture and objects used by Darwin himself and are decorated to reproduce the surroundings in which he worked. Charles Darwin's home at Downe has thus now become a place of pilgrimage similar in character and contents to the home of George Washington at Mount Vernon, Virginia, and similarly brings thousands of visitors to the shrine.

The British Association differs from other scientific societies in the fact that no professional rank or other technical qualification is required on the part of an applicant for admission to its membership. It is, therefore, open not only to scientific students and investigators, but also to any member of the community interested in science. The Association does not invade the field marked out by other scientific organisations, but provides common ground on which representatives of them all can meet to discuss methods and results of scientific research and foster public interest in them.

The objects for which the Association was constituted are: to give a stronger impulse and a more systematic direction to scientific enquiry; to promote the intercourse of those who cultivate science in different parts of the British Empire with one another and with foreign philosophers; to obtain a more general attention for the objects of science and the removal of any disadvantages of a public kind which impede its progress.

The legislative body of this parliament of science is a General Committee of about seven hundred members who have qualified to serve upon it by the publication of contributions to the advancement of science. This Committee has similar functions to those of the British Parliament, and it similarly elects the Council and Officers to act as a Cabinet governing the Association's affairs.

The Association meets annually as a corporate body, and the place of the meeting is decided by the General Committee not less than two years in advance. Invitations to meet at particular places are sent to the Association by municipal and other authorities; and there are usually several of these awaiting acceptance every year. The average number of membership tickets issued at an annual meeting is above two thousand, but at some meetings the number has been more than twice as great. At every annual meeting many local residents and others not professionally engaged on scientific work become members, and the expenses of the meeting are borne by the local authorities and their supporters. Since the foundation of the Association in 1831 meetings have been held in most of the chief cities and towns of Great Britain, as well as in Ireland, Canada, South Africa, Australia, and India.

There are now thirteen sections of the Association, each with its own president and secretaries, and together they cover all branches of scientific knowledge. The sections meet separately for the consideration of their own special subjects,

but two or more sections often meet jointly for the discussion of contributions of common interest. Communications to the various sections relate usually to the position of researches in which the authors are engaged and to problems arising out of them.

Results of new investigations are often announced at the annual meetings and are sometimes of great scientific interest. For example, it was at the annual meeting at Oxford in 1894 that Lord Rayleigh and Sir William Ramsay announced the discovery of a new gas, to which the name argon was given, in the earth's atmosphere. This gas is now widely used to increase the life and efficiency of electric bulb lamps. Another similar gas, neon, afterwards isolated from the air, is used in electric discharge tubes for advertisement and other purposes. The discovery of the existence of the electron, upon which the transmission and reception of electric waves used in all forms of radio communication depend, was announced by Sir Joseph Thomson at the annual meeting of the Association in 1897. Five years earlier, Sir Oliver Lodge had given, at the annual meeting, the first demonstration that electric waves could be used for signalling in the Morse code, over a distance of sixty yards, through two internal and one external wall.

At every annual meeting, research committees are appointed to report upon particular subjects and problems of scientific importance. These reports, presented at following meetings, constitute the most influential part of the Association's activities. The work of these committees is entirely voluntary, but small financial grants are made to cover essential expenses. Fully one half of the total receipts for membership tickets for annual meetings have been devoted to scientific investigations by means of such grants, the total amount being about £1,000 a year. The Association receives no assistance from public funds, and possesses, therefore, the freedom of service highly cherished by most British scientists.

Through its research committees, the Association has initiated many new scientific movements which have afterwards been maintained from public and other funds. The Kew Observatory, now under the British Meteorological Office, and one of the most renowned institutions in the world, was placed at the disposal of the Association by Queen Victoria just a century ago. The Government at that time had decided no longer to maintain the building as an observatory and museum, for which purposes it had been built by King George III. In spite of its slender financial resources, the responsibility for maintaining the Observatory as a centre of work in meteorology, terrestrial magnetism and electricity, and related subjects, was undertaken by a committee of the Association, and the results of this decision have influenced the progress of geophysical knowledge everywhere. Between 1843 and 1872 the Association made grants to the Kew Observatory amounting to £12,300, by far the largest total to any of its committees at any time in its history, and the whole of this amount was derived from the membership subscriptions at annual meetings.

Another example of work of international value is that carried out by British Association Committees on electrical standards. Eighty years ago there were no generally recognised units or standards for the measurement of electrical resistance, current, electromotive force, quantity, capacity and similar values. The Association undertook investigations of this subject over a long period of years, and the standards specified and constructed by its committees have become international, thus assisting trade and manufacture everywhere. In all the principal countries of the world the same electrical units and standards are adopted. The British Association was responsible for the institution of this uniform system.

Reports of this kind, with the inaugural address given annually by the President of the Association, and the addresses delivered to the separate Sections by their respective presidents, are now published in a quarterly review with the title, 'The Advancement of Science,' instead of a bulky annual volume. The current issue of this review includes all the papers read at the Conference on Science and World Order held in London in September of last year. The Conference was arranged by the Association's Division for the Social and International Relations of Science, and was attended by distinguished men of science and other citizens of more than twenty nationalities. This was the first occasion upon which representatives of science, administration and government met together to consider problems of the adjustment of progressive scientific knowledge to social action.

The Division was established in 1938 to further the objective study of contacts of science with social conditions, and to promote the welfare of human communities by international understanding of them. It is empowered to hold meetings or conferences at any time with the view of attaining these objects ; and it represents the response of the Association for co-operation in the shaping of a social structure worthy of the powers which science has given to civilised communities. When General Smuts was President of the Association at the Centenary Meeting in 1931, he pointed out in his presidential address on 'The Scientific World-Picture of To-day,' that 'One of the greatest tasks before the human race will be to link up science with ethical values, and thus to remove dangers threatening our future.' Every president since then has referred in his inaugural address to the social implications of science and the need for effective recognition of them. By the establishment of its new Division the Association has adapted itself to the needs of the times, and provided a new co-operative federation of thought and action on contacts of science with social and international affairs.

Every association for the advancement of science, constituted like the British Association and including not only scientific workers but also members of the community engaged in other pursuits, can take part in this development of its fields of activity. Freedom from any sort of political influence or domination is a characteristic of British scientific societies and is essential for the impartial study of social and international problems. Since the British Association was founded, similar bodies have come into existence in the United States, Australia, New Zealand, South Africa, and other countries, and all of them

possess the spirit of co-operation for the increase of knowledge and the service of mankind.

Meetings of the Association outside Great Britain have always stimulated interest in science and its relationships to the community. There is nothing in the constitution of the Association to prevent such meetings being held outside the British Commonwealth, or for delegates to be sent to a conference in any country. The expanded outlook represented in the new Division for the Social and International Relations of Science can give high public significance, as well as scientific authority, to such a meeting anywhere in the world.

CURRENT PROCEEDINGS

APART from the work of certain research committees, on which reports will be made in due course, the present activities of the Association are almost wholly those of its Division for the Social and International Relations of Science. The simple mechanism of the Division, in contrast with the elaborate organisation involved in peace-time meetings of the Association, has proved its value in enabling the Association to maintain activities appropriate to present conditions. The Conference on Science and World Order held by the Division in September, 1941, served to bring under review a number of questions relating to post-war reconstruction. These were examined by the Officers and Council of the Association and the Executive of the Division, with a view either to further action on the part of the Association, or for reference to other organisations, or to collaboration between the Association and other organisations.

The Advancement of Science, No. 5, published by the Association (Jan., 1942; 120 pp.; price 5s.) contains a full report of the transactions of the Conference on Science and World Order, together with certain communications pertaining thereto but received subsequently.

A Pelican book entitled *Science and World Order*, compiled by J. G. Crowther, Dr. O. J. R. Howarth, and Dr. D. P. Riley, with the help of collaborators, and published by Penguin Books, is in the press.

Conferences.—The Conference on European Agriculture, the transactions of which occupy the major part of the present issue of this journal, arose, as indicated on p. 123, out of the preceding Conference referred to above. The committee mentioned on p. 178 as having been appointed after this agricultural conference is already engaged on important inquiries relating to agriculture in Europe after the war.

Another similar Conference on Mineral Resources and the Atlantic Charter has been announced to take place on July 24–25, 1942. It is hoped to publish its transactions in the autumn.

Science in relation to Building and Territorial Planning.—On the direction of the Council of the Association, the Executive Sub-committee of the Division convened a meeting, with assessors, to consider what action, if any, might be desirable on the part of the Association in connection with these questions. Representatives of the principal institutions concerned were present. It was decided to form a committee to inquire into and report upon the state of science in relation to building and territorial planning. Subsequently it was found inexpedient to proceed at present with the subject of building; but a committee was formed under the chairmanship of Dr. Dudley Stamp with a view to strengthening the applications of science (e.g. in geology, geography, ecological botany and zoology, soil science, agricultural economics, and forestry) to rural planning in particular.

Post-war University Education.—The Executive Sub-committee of the Division, on the instruction of the Council, held a meeting, with assessors, to consider what action, if any, should be taken by the Association in relation to the subject of post-war university education. It was decided that a committee be appointed with wide terms of reference, as follows:—

(*a*) To consider the general policy and methods of university education with a view to promoting international collaboration and the free interchange of ideas, and relating university education to the needs and service of the community.

(*b*) To consider the re-planning of teaching departments and curricula in accordance with modern conceptions of the interrelations of different branches of knowledge, particularly those of science and the humanities.

(*c*) To survey the position regarding teaching material, apparatus, books, and staff, in universities which have been damaged, destroyed, disorganised, or closed as a result of the war, and to make recommendations for their rehabilitation.

This committee has been formed under the chairmanship of Dr. Maxwell Garnett, C.B.E., with Prof. F. E. Weiss, F.R.S., and Mr. A. Gray Jones as joint honorary secretaries, and is actively engaged on its task.

Social Sciences.—A meeting of the Executive Sub-committee, with assessors, was arranged to consider, and if desirable, to give effect to, measures for further discussion on the present position of the social sciences. The Division for the Social and International Relations of Science has been asked to set up a committee to consider how the results of social and ethical research can best be brought to bear on the formation of public policy.

A Standing Committee has been appointed by the Council to consider and give effect to means of *extending public understanding of the benefits of science.* Incidental reference to this subject was made during the Conference on Science and World Order, and the holding of a Conference on this subject is under consideration.

Scientific Terminology.—Preliminary consideration has been given to this question, with a view to possible international action.

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